THE DENTAL PRACTITIONER

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Tables should be typed on separate pages and each should have a caption which will explain the data without reference to the text.

References to dental literature should be recorded in the text, with the name of the author and the year of publication in parentheses. In the bibliography they should be arranged in alphabetical order in the following form, the abbreviations of periodicals being those adopted in the *World List of Scientific Periodicals* (1952), e.g.:—

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LEWIS, R. W. B. (1947), *The Jaws and Teeth*, 2nd ed., 471. London: Science Publishing Co.

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THE DENTAL PRACTITIONER AND DENTAL RECORD

Vol. VI, No. 5 January, 1956

EDITORIAL

THE EDITORIAL BOARD

THIS year the DENTAL PRACTITIONER AND DENTAL RECORD begins on a new note with the formation of a consultant editorial board to guide its destiny. Since the incorporation of the *Dental Record* the need for such a committee has become more and more evident. The number of articles submitted has increased and each has to be carefully read and considered before a decision as to publication can be made; in addition, more books are received for review and more journals available for abstracting. Not only has the editorial burden increased but also the responsibility of editorship. It was therefore decided to approach the Dean of each of the dental schools in Great Britain and Northern Ireland and to ask that the school be represented on a new editorial board for the journal. The response was immediate and indeed most gratifying, for it shows that the standing of the journal in the profession is acceptably high, and this is reflected in the list of eminent names who make up the new editorial board. In addition to these representatives, there are three general practitioners, two of whom have served on the journal since its inception. At first sight it might appear that the board is too academic in character for a journal designed in the main for the general practitioner. However, it should be realized that the majority of articles are written by members of the profession attached to dental schools and hospitals. It is also the duty of many teachers to undertake research into new materials and techniques and to publish the results for the edification of the profession and for the ultimate good of patients attending general practitioners. We must admit that this is not by any means the only source of research or of articles in general. The general practitioner is still the key man in the profession and it is he on whom we depend for the success of the journal. The three general practitioners on the board have, then, an important part to play in the running of the journal and we are sure will give the necessary balance between the highly scientific and the down-to-earth aspects of dentistry. In welcoming all the new members of the editorial board may we say: *Altius ibunt qui ad summa nituntur*—they will rise higher who aim at the greatest things.

SCOTTISH DENTAL ESTIMATES BOARD

The Secretary of State has reappointed Dr. J. L. Trainer, Dental Surgeon, Kelso, to be a part-time member of the Scottish Dental Estimates Board for a further period of three years beginning on Jan. 1, 1956.

THE TUBERCULATED PREMOLAR

By **F. A. C. OEHLERS,** L.D.S. (S'pore), F.D.S. R.C.S. (Eng.)
Department of Dentistry, University of Malaya, Singapore

THE literature on an anomalous form of premolar which constitutes the subject of this paper has been reviewed by Lau (1955).

The present paper is based on 110 cases and on the examination of several ground and decalcified sections of the anomalous premolars.

Fig. 1.—Higher magnification of the tubercle and underlying pulp horn as shown in *Fig.* 5. Note how the dentinal tubules run obliquely to the sides of the pulp horn. The outline of the pulpal abscess cavity and necrotic tissue (N) within it can be seen. (× 27.)

The morphological features of the anomalous tooth which possesses an enamel-covered tubercle on its occlusal surface have been described by others.

HISTORICAL FEATURES

In the English language literature, Tratman (1949) and Lau (1955) have described the histological features of the anomaly as seen in ground sections. Lau has explained the difficulties in demonstrating what he calls the "axial core" and "axial canal" of the anomaly in their entirety, and has described a technique that he uses to overcome these difficulties. His sections, however, were relatively thick and were examined, presumably, with reflected light.

The author is of the opinion that the main histological features of the anomaly can be accurately interpreted only by the examination of serial decalcified sections. Such sections show each tubercle to consist of a central core of dentine, the tubules of which run directly to the tip and obliquely to the lateral walls of an underlying slender pulp horn (*Fig.* 1). The latter springs from the pulp immediately opposite the tubercle and is directed towards its centre. As a rule, its length varies with that of the tubercle, so that in a well-developed specimen the horn extends to within the tubercle itself (*Fig.* 2), while in a less developed specimen it stops short of the tubercle.

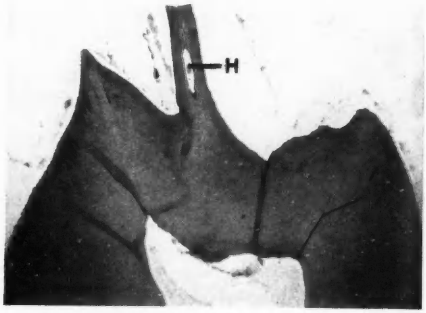

Fig. 2.—Longitudinal section of the same tooth as seen in *Fig.* 5, showing the actual occlusal limit of the pulp horn (H) within the tubercle itself. There is no direct exposure of the pulp, but its death was probably due to ingress of bacteria through the exposed dentinal tubules of the fractured tubercle. (× 10·6.)

When a ground section is examined with reflected light, the dentine adjacent to the pulp horn appears as a cylindrical column in sharp contrast to the rest of the coronal dentine. This column has been described by Lau (1955) as the "axial core", which he

considers to be the essential part of the anomaly, but the author believes that it is the result of an optical illusion brought about by the oblique course taken by the dentinal tubules as they approach the walls of the pulp horn. In decalcified and thin ground sections examined with transmitted light no such well-demarcated column is seen, but the dentine immediately adjoining the pulp horn merges subtly with the rest of the coronal dentine. It would seem, therefore, that the pathogenesis and nomenclature of the anomaly as suggested by Lau are not tenable as both are hinged on the existence of an "axial core".

ASSOCIATED CLINICAL FEATURES

Lau (1955) reports the existence of the anomaly in molars, canines, and incisors in addition to premolars. In the present series a frequent feature was a marked accentuation of the lingual ridges of the canine teeth at their incisal aspects, so that the tips of these teeth appeared elongated and sharp, almost tuberculated, before attrition set in (*Fig.* 3). In one case small enamel-covered excrescences were seen on the distolingual cusps of the mandibular first permanent molars and on the mesiobuccal cusps of the maxillary second permanent molars. In each of these cases, however, the anomalous premolar was the salient clinical feature. The present author therefore prefers to consider such molars and canines, at least from a clinical point of view, as associated features.

With regard to the existence of the anomaly in incisors, the present author would tend to regard Lau's statement with some reservation if he bases his diagnosis on radiographical findings as he does of his Case 51. As the dentine ("axial core") immediately surrounding a pulp horn has the same degree of radiopacity as the rest of the dentine, and as the pulp horn itself is so slender as to be undetectable in radiographs, it is debatable if his interpretation of the radiographs can be accepted.

In the present series one patient possessed a dens in dente involving a maxillary second incisor; another a geminated mandibular second incisor and canine. In a family of five children, of whom two possessed anomalous premolars, one member possessed a geminated odontome in place of a mandibular second premolar. Her other premolars were normal.

Whether or not such accompanying abnormalities are of any aetiological significance is not known, but it is well known that where one congenital abnormality of any form is present, it is not unusual to detect other abnormalities in the same person.

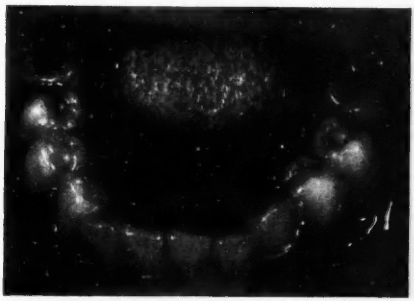

Fig. 3.—All four mandibular premolars are anomalous. The well-formed tubercle on $\overline{5}$ is still unfractured but slightly worn at the tip. That on $\overline{5}$ is fractured. A chronic periapical abscess was associated with the tooth. $\overline{4}$ represents an intermediate form of the anomaly. The tip of the tubercle has undergone attrition with resultant exposure of dentine. $\overline{4}$ represents the simplest form with an occlusal mound on the buccal triangular ridge. The lingual ridge of the right canine is distinctly accentuated at its incisal aspect. The patient was a Chinese girl aged 13 years.

COMPLICATIONS

The earliest possible complication arises as the anomalous premolar erupts to the level of occlusion, when the tubercle interferes with the normal interdigitation of the cusps of the opposing premolars. In this way it will tend to impede the full eruption of either that tooth or the opposite premolar, whichever erupts later. Displacement, tilting, or rotation of these teeth are also liable, particularly if a neighbouring tooth is missing.

If a tooth is subjected to a sudden and unexpected force, some degree of subluxation may arise. In this respect one may occasionally see in radiographs a slight dilaceration

about halfway along the root of an anomalous premolar which roughly corresponds with the level of root development at the time when the tooth reaches occlusion (*Fig.* 4).

At least one patient was aware of the fact that the tubercle on one of his premolars obstructed his bite and requested that it be ground down. That these anomalous teeth are liable to traumatogenic occlusion cannot, therefore, be discounted.

However, the most important complication associated with the anomaly is the occurrence of a periapical abscess (*Fig.* 5). It is interesting to note that, in the present series, 30·3 per

Fig. 4.—Radiograph of an anomalous mandibular second premolar showing a dilaceration halfway along the root.

cent of the anomalous mandibular second premolars and 9·9 per cent of the mandibular first premolars were so affected. No maxillary premolars were involved. It was noted that the tubercles associated with mandibular premolars were usually the best developed. It would appear, then, that the fate of the tooth is dependent on the degree of development of the tubercle and the extent of the underlying pulp horn. The larger the tubercle the more liable is it to fracture once it is subjected to normal masticatory forces, and organisms thereupon gain entry into the pulp either through the exposed pulp horn or via the patent dentinal tubules (*Fig.* 2), as described by Tratman (1949).

With pulp necrosis there is cessation of root development which occurs at a level between halfway to two-thirds of its normal length, corresponding with the time when the tooth reaches the occlusal level (*Figs.* 5, 6). The root canals remain wide and funnel-shaped.

In two cases the apices of the roots had continued to develop quite separate from the rest of the tooth (*Fig.* 7). This peculiar occurrence could only have happened if a portion of the dental papilla and Hertwig's sheath had remained viable while the rest of the pulp, confined within the dentinal walls of the root canal, succumbed. The infection must therefore have been of a low grade to allow this.

Fig. 5.—Longitudinal buccolingual section (decalcified) of an anomalous premolar (with a fractured tubercle) recovered from a 12-year-old Chinese girl. There was an associated acute alveolar abscess.

Note the slender pulp horn extending towards the tubercle (T). The pulp is necrotic, but the outline of a pulp abscess (A) opposite the pulp horn can be seen. There has been arrested development of the root, which is funnel-shaped and encloses an apical granuloma (G). The latter, under high power, shows superimposed acute inflammatory changes. (× 6.)

An additional possible factor was a dislocation of the then calcified portion of the root upon the uncalcified tissue, with severance of their continuity. *Fig.* 7 A shows the apical fragment to be situated slightly mesial to the end of the cervical portion of the root.

PATHOGENESIS

Tratman (1949) describes the mode of formation of the anomaly as an abnormal proliferation of the enamel-forming epithelium leading to an invagination of the inner-enamel epithelium and dental papilla in the enamel organ itself—the antithesis to the mode of formation of the dens in dente. He thus describes it as a "form of the simplest type of dilated odontome".

For the purpose of classification, the author accepts this description provided that the term "odontome" does not imply a neoplasm (in the true sense of the word) but merely a harmartoma. That there is abnormal proliferation of the enamel organ there is no doubt, but the proliferation occurs in a co-ordinated manner so that, during the period of morpho-differentiation, the inner enamel epithelium assumes the blue-print pattern of the future amelodentinal junction in the normal way except that it also includes that of the future tubercle.

What influences this aberration is not known, but a hereditary or racial factor is likely. It is probable that the development of canines with exaggerated incisal tips and of the affected molars is also influenced by this factor.

NOMENCLATURE

Because the anomaly under discussion is a distinct clinical entity it is necessary to select a term by which the condition can be known. Lau's suggestion of "odontome of the axial core type" is not tenable as such a structure as an "axial core" does not, to the present author's mind, exist. It is popularly known in Malaya as "Leong's premolar", in view of Leong's role in its discovery in that country. From a descriptive point of view such a name is meaningless and for this reason the author prefers simply to use the term "tuberculated premolar".

To refer to it as a "supernumerary cusp of the premolar" is not specific. Added to this,

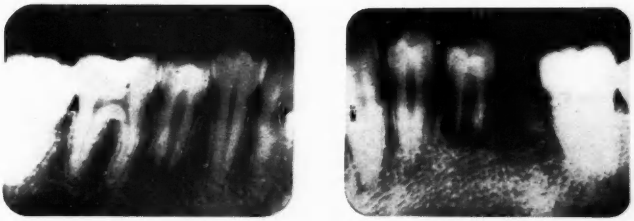

Fig. 6.—Radiographs of anomalous mandibular first and second premolars. There has been arrested root development of both second premolars, leaving the root canals wide and funnel-shaped. Periapical areas of rarefaction are associated with both the teeth. The roots and periapical tissue of the first premolars are normal.

A B

Fig. 7.—A, Radiograph showing continued formation of the apical half of the root of an anomalous mandibular second premolar quite separate from the rest of the root. Note the wide root canal of the cervical half of the root indicating pulp necrosis and arrested dentine apposition in contrast to the narrow root canal of the apical half. The area of rarefaction surrounds the breach between the two halves of the root. B, Radiograph of the specimen after extraction.

the tubercle does not conform morphologically or clinically with the accepted meaning of the term cusp. The term "occlusal pearl", as coined by Pedersen (1949), is likewise vague and cannot be accepted.

SUMMARY

1. The histological and associated clinical features of an anomalous form of premolar variously referred to as a "form of the simplest type of dilated composite odontome", "supernumerary cusp", "enamel pearl", "Leong's premolar", or "odontome of the axial core type", and named by the author simply as "the tuberculated premolar", are described.

2. The occurrence of possible attendant complications of tooth derangement, traumatogenic occlusion, and pulp necrosis, with eventual periapical infection, is explained.

3. Its possible mode of formation is also discussed.

Acknowledgements.—I am grateful to Mr. K. K. Chee, who prepared the microscopical sections; to Mr. K. P. Yap, who took the photographs and photomicrographs; and to my colleagues at the Department of Dentistry, University of Malaya, and the General Hospital, Singapore, who brought the cases that they encountered to my notice.

REFERENCES

LAU, T. C. (1955), *Brit. dent. J.*, **99**, 219.
PEDERSEN, P. O. (1949), *The East Greenland Eskimo Dentition*. Copenhagen.
TRATMAN, E. K. (1949), *Brit. dent. J.*, **86**, 271.

AN IMMEDIATE SPLINT FOR CASES OF TRAUMA TO THE INCISOR TEETH

By **A. M. HORSNELL**, F.D.S., M.R.C.S., L.R.C.P., and **GRACE BROWN**, F.D.S.
Department of Conservative Dentistry, London Hospital Dental School

IT is now established that many cases involving trauma to the incisor teeth of children which result in crown fractures of one or more teeth, and/or damage to the supporting structures, can be treated successfully provided that the case is seen early enough, and the appropriate line of treatment decided upon and implemented without delay (Cooke and Rowbotham, 1951).

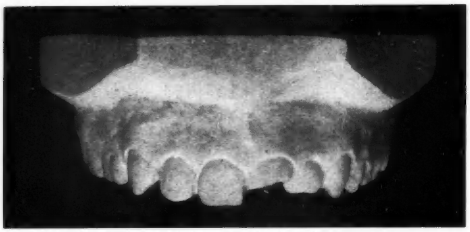

Fig. 1.—Model showing "class 2" fracture.

The treatment indicated obviously will vary according to the degree of involvement of the supporting structure, and with the class of fracture (Ellis, 1952). However, in very many cases the immediate treatment indicated is protection of the fractured surface of the crown and support to the tooth or teeth involved (*Fig.* 1). This usually can be provided only by means of a splint (Horsnell, 1952).

The production of a standard acrylic or metal splint may often involve a delay of 24 hours; and in certain instances this delay is not only undesirable, but may in fact completely alter the prognosis, allowing a case in which there was every hope of resolution to become one in which the pulp degenerates.

In order to fabricate a suitable splint and so obviate the usual delay, various materials and different methods have been tried. Finally a suitable material has been found and a simple technique evolved which makes the construction of an immediate splint a feasible proposition in any practice which has workroom facilities, and even in those where such facilities normally are not available.

The technique is based on the speed with which an accurate and stable working model can be made in low fusing metal from an

alginate impression, and the use of a fabric material containing a high percentage of woven glass fibres in a matrix of resin (Fibercryl) in combination with a self-polymerizing acrylic (Autocryl).

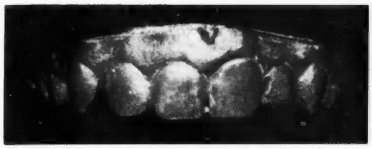

Fig. 2.—Model in molten metal (the fractured tooth has been built up as described in the text).

Alginate is used for taking the impression, as this material, while giving accurate reproduction, is also well tolerated by the patient even when the teeth and gingival tissues have been severely damaged. In these circumstances other types of impression material not only cause added discomfort but fail to give an accurate reproduction of the area involved.

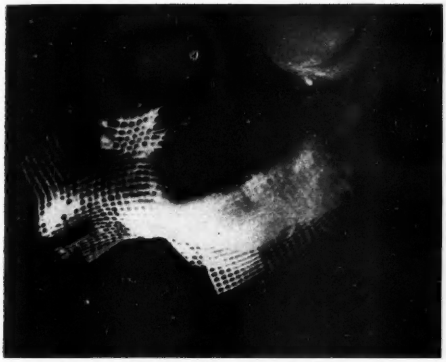

Fig. 3.—"Fitting down" of the Fibercryl.

METHOD

The alginate impression should not be immersed in water unless this is necessary to remove blood or mucus, in which case any moisture should carefully be removed by means of compressed air. Unless the impression surface is completely moisture-free at the time of pouring the metal, spitting will ruin the model. The fusible metal (melting-point 65° C. (167° F.)) should be melted in a small ladle over low heat, and it should be poured at a temperature only slightly over melting-point, otherwise distortion of the model will occur.

As soon as the metal is solid it is carefully and gently prised out of the alginate with a Le Cron carver or similar instrument, so that a duplicate model may be poured in the same impression.

The original model (*Fig.* 2) is used for the construction of the splint and the duplicate for checking on completion.

A piece of Fibercryl, cut to the approximate size of the area to be splinted, is then soaked in a portion of Autocryl liquid. It is removed almost at once and while still soft is fitted down with the fingers over the teeth of the original model (*Fig.* 3). (A cellophane film is supplied with the Fibercryl fabric to protect the fingers from contact with the monomer.) Only one thickness of Fibercryl is used, the remaining bulk of the splint being built up in Autocryl. If the Fibercryl does not remain firm on the model after moulding it may be fastened in position by painting on to and through it a little thin creamy Autocryl, mixed in a Dappen glass.

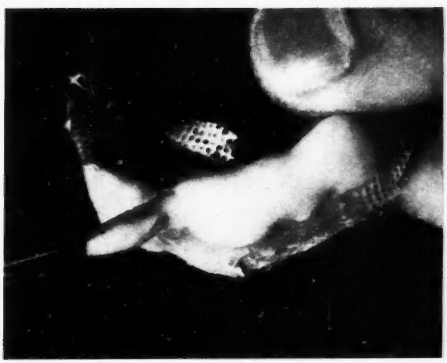

Fig. 4.—Painting on of Autocryl to provide bulk.

A further creamy mix of Autocryl powder and liquid is now made and the painting on, which provides the bulk of the splint, is commenced without delay (*Fig.* 4). Care should be taken to avoid undue thickness on the palatal surfaces of the teeth which may result from the mixture flowing down. If this precaution

is not taken the splint may gag the bite, which is undesirable in itself and may also lead to loosening of the splint.

On completion of the "painting on" the metal model with splint still in position is immersed in *warm* water for a few minutes in order to accelerate the setting (polymerization)

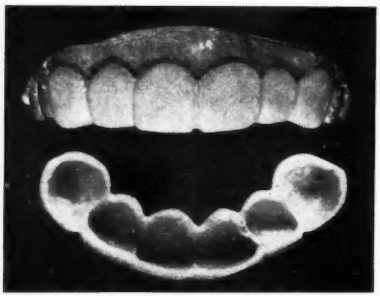

Fig. 5.—The completed splint.

of the Autocryl. On removal from the warm water, the splint is held firmly in a pair of tweezers and the model removed by melting it out under a continuous flow of *boiling* water. If the whole is held over a bowl the metal may be collected for re-use.

The completed splint (*Fig.* 5) will require the minimum of trimming with a file and stones and a final polishing on the lathe with a soft brush.

The duplicate model will usually be found useful to check the fit of the finished splint, but it must be borne in mind that it is a second pouring into the impression and occasions will arise when it cannot be relied upon.

The most skilful part of the technique will be found to be the "painting on", but after a little practice it will be found possible, within the setting time, to paint a solid and durable shell splint nearly equal in strength and appearance to one produced by the lengthy wax and process method. Autocryl ivory powders are manufactured in various shades which may be mixed to provide natural blends. One can prepare a "stock" mixture of the powder suitable for the majority of cases.

If it is felt desirable to build up a fractured tooth or teeth in order to restore appearance and to give room for the calcium hydroxide or zinc oxide dressing, this may be done by cutting out the relative portion of alginate from the impression before it is cast with a small sharp instrument. The portion of the impression which is cut out should be slightly larger than that which is to be restored, and, after casting, the metal tooth is filed or burred down to the correct size before the construction of the splint is begun. Details such as this may sound time-consuming, but in practice they occupy only a few minutes, and the claim that an æsthetic and durable splint can be made within an hour will prove a sound one.

Fitting of the Splint.—All surfaces of the teeth which are to be included in the splint are carefully cleaned, using a rubber cup, with toothpaste. The area is gently sprayed with warm water from an atomizer and dried with wool followed by warm air. The splint is cemented on to the teeth with zinc oxy-phosphate cement. (If a tooth fracture is present and the pulp is not exposed the fractured surface should be covered with a creamy mix of calcium hydroxide and water or smeared with zinc oxide and eugenol before the splint is cemented into place.) Zinc oxide and eugenol mix is not suitable as a cementing medium for the splint as the eugenol affects the acrylic resin.

For routine inspection and vitality tests the splint is easily removed and readily re-cemented.

Our thanks are due to Mr. P. Broadbery, London Hospital Photographic Department, and also to Mr. K. Sturmer, senior technician in the Department of Children's Dentistry, London Hospital, for his painstaking co-operation in making innumerable splints of different materials and his assistance with the technical details in the text.

REFERENCES

COOKE, C., and ROWBOTHAM, T. C. (1951), *Brit. dent. J.*, **91**, 146.

ELLIS, R. G. (1952), *The Classification and Treatment of Injuries to the Teeth of Children*, 3rd ed. Chicago: Yearbook Publishers Inc.

HORSNELL, A. M. (1952), *Brit. dent. J.*, **93**, 105.

ANGLE'S CLASS III MALOCCLUSION*

By S. G. McCALLIN, L.D.S. R.C.S. (Eng.), D. Orth.

THIS paper on Class III malocclusion contains no original research, but will be an attempt to present an approach to diagnosis and treatment which is the result of clinical observation of fairly large numbers of patients in this category that have received treatment at the Eastman Dental Hospital in recent years.

Edward H. Angle, who did so much for orthodontics, said many things he would want to retract were he alive to-day. In his view the problem to-day from quite a different point of view. We believe that the dento-alveolar structures, as they grow from the dental base to meet across the intermaxillary space, are moulded by pressures exerted by soft-tissue posture and behaviour to bring the teeth into either normal occlusion or variations from the normal. Skeletal morphology and soft-tissue behaviour in any given case is, therefore, fundamental to the production of

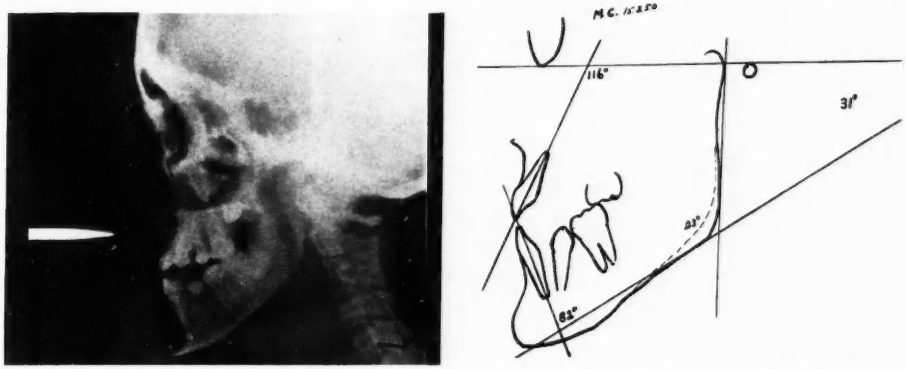

Fig. 1.—Lateral skull X-ray with tracing illustrating a Type I skeletal pattern in association with a Class III (Angle) malocclusion.

if one moved teeth in malocclusion into what we know as normal occlusion as the result of mechanical interference, function would stimulate growth of bone to support the teeth so placed and facial harmony would follow as a result of this. While none of us believes this to-day we are, nevertheless, indebted to Angle for many things—not least his classification of malocclusion which makes it possible for me to discuss Class III cases without having to define them. His classification was entirely adequate for his purposes since he was convinced that one only had to place teeth in normal relationship to each other and they would remain stable.

In our search for the aetiology of malocclusion in general I believe that most of us approach either normal or abnormal occlusion. Bearing this in mind it is possible to make a prognosis for treatment in most cases, and this applies to Class III as to other occlusal types.

It is probably easiest to describe these cases in terms of the two extremes of morphological types observed, although a statistical analysis of cases would probably show a smooth distribution of variations between the two. Only by thinking in terms of the morphological characteristics of the two extremes can we approach diagnosis and treatment planning logically.

The first extreme type, which from here on will be referred to as Type I, has a characteristic skeletal pattern. The mandible is long, with a gonial angle which is above average. The maxilla is short anteroposteriorly and contracted laterally. There is usually a

* Given at the Sheffield meeting of the British Society for the Study of Orthodontics on Friday, May 6, 1955.

large intermaxillary space anteriorly. This space may or may not be completely spanned by the dentoalveolar structures. As a result of this skeletal morphology the face is long

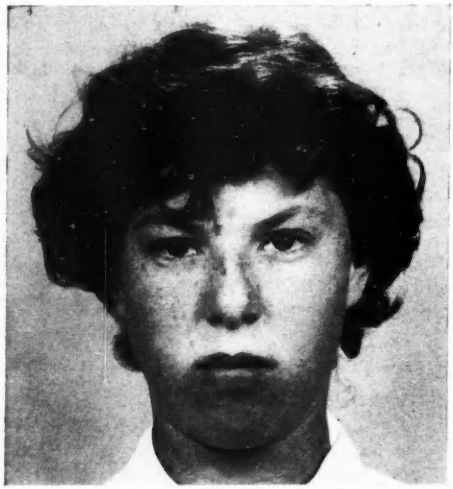

Fig. 2.—Patient holding incompetent lips together by contraction of circumoral muscles, especially the mentalis muscle in the lower lip. She has a Class III (Angle) malocclusion on a Type I skeletal pattern.

and the middle third is concave in profile owing to the short maxilla (*Fig.* 1).

Associated with this skeletal pattern we observe soft tissues exerting pressures that produce occlusal variations that might be considered typical. Some of these occlusal variations will be described below, but first let us consider the soft-tissue morphology and behaviour most commonly seen.

We often find the tongue in resting posture in the floor of the mouth in association with a hyoid bone which appears in lateral radiographs to be below average level. The tongue is at rest in this position frequently with the posterior oral sphincter closed, the dorsum of the tongue being in contact with the soft palate. It is, however, found in this position in association with incompetence of the anterior and posterior oral sphincters when the patient will be mouth breathing or supplementing nasal breathing with oral breathing (Gwynne-Evans and Ballard, 1947).

Competent lips are seen in association with this type of skeletal morphology, but frequently a degree of lip incompetence is observed. It is not surprising that lips of average size do not come together in resting posture in these long-faced individuals, and this means that during function to close the anterior oral sphincter the lips tend to exert a firm pressure against the upper and lower labial segments of the dental arches (*Fig.* 2). Another morphological type of lip incompetence observed is one where the tissue of the lip is adequate for lip competence to be expected, but the lower lip hangs away from the lower incisors rather in the way that the lower lip is everted in the typical cleft-palate profile. This type of lower lip normally exerts little or no pressure against the lower labial segment.

To return to the tongue for a moment, one sees patients with this type of abnormal skeletal pattern who thrust their tongues between the upper and lower incisors at the moment of deglutition as described by Rix (1946). This behaviour pattern, together with the other soft-tissue variations I have mentioned, produce occlusal variations as follows.

Crowding of the teeth in the maxillary arch as the result of the short and laterally contracted maxilla is a common occlusal variation met with (*Fig.* 3). This crowding may be further complicated where the tongue adopts a low resting posture, as the maxillary dento-alveolar structures are free to contract on the dental base still further. Since the intermaxillary space is often above average the dento-alveolar structures are deep, so that the tongue is possibly never in contact with the hard palate and the maxillary dental arch fails to be moulded laterally. The mandibular arch is, however, moulded laterally, and since the dental base is large a typical wide and rounded arch is produced. These wide lower arches in association with narrow uppers result in unilateral or bilateral crossed bites, depending on the degree of discrepancy between the two arches.

Unilateral crossed bite is frequently associated with lateral displacement of the mandible to one side or the other as a result

of occlusal interference. This displacement becomes spontaneous, so that the mandible moves from rest position into occlusion smoothly without hitting the occlusal interference *en route.*

Just as low tongue posture can produce an unusually wide lower arch, so can it produce an unusually long one, and the lower labial segment may be separated from the buccal segments. This happens when this tongue posture is associated with a mandible having an unusually long body, and it means that the buccal segments of the lower arch play no part in supporting the lower labial segment from lingual collapse.

The forward pressure of a tongue postured in this way when the mandible is short can produce a Class III incisor relationship, while the dental base relationship is relatively normal.

Alternatively it is possible for soft-tissue pressures to produce a fairly normal occlusion on a high-gonial-angle type of Skeletal III dental base, lip tongue balance being such that the lower labial segment is held lingually inclined so that the lower incisors are in a fairly normal over-bite relationship with the upper incisors and the upper and lower buccal segments are in good relationship. Anterior oral incompetence where the lips in function exert a firm pressure against the labial segments and the tongue is not held in the floor of the mouth would bring about this type of occlusion.

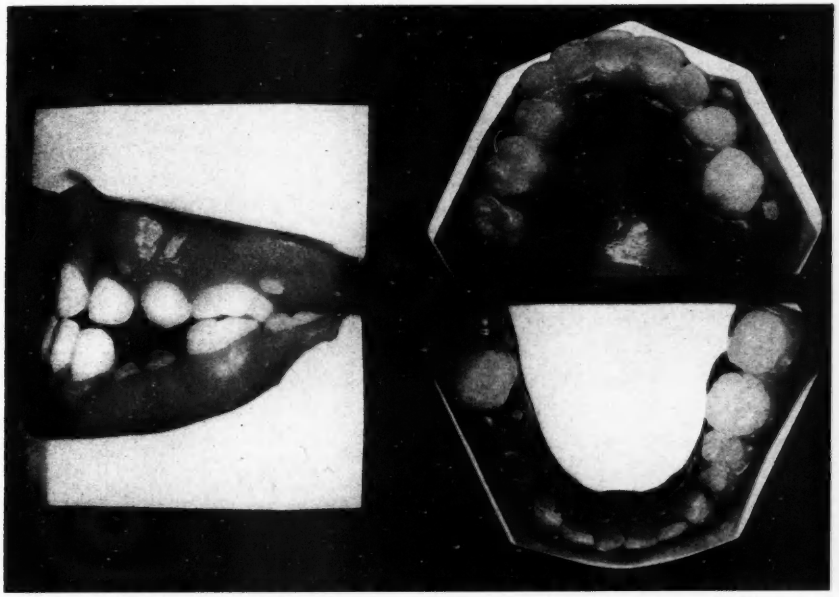

Fig. 3.—Models of a Class III (Angle) malocclusion on a Type I skeletal pattern. Relatively poor development of the maxilla has resulted in displacement of $\underline{5|}3\overline{57}$ from the upper arch. In the lower, early loss of deciduous teeth and $\overline{6|}$ from the buccal segments has resulted in collapse of the lower labial segment.

A further occlusal variation that is the result mainly of skeletal morphology is an anterior open-bite. The dento-alveolar structures fail in their vertical development to span the intermaxillary space in the anterior part of the mouth. Frequently these patients can only occlude on two posterior teeth on either side, with the open-bite extending to the back of the mouth (*see Fig.* 1). A further type of anterior open-bite can be explained as being the result of an anterior tongue thrust at the

moment of deglutition, or possibly the tongue is postured between the upper and lower incisors at rest.

This mesial displacement is less commonly seen on this type of dental base than in the other type of extreme variation described below.

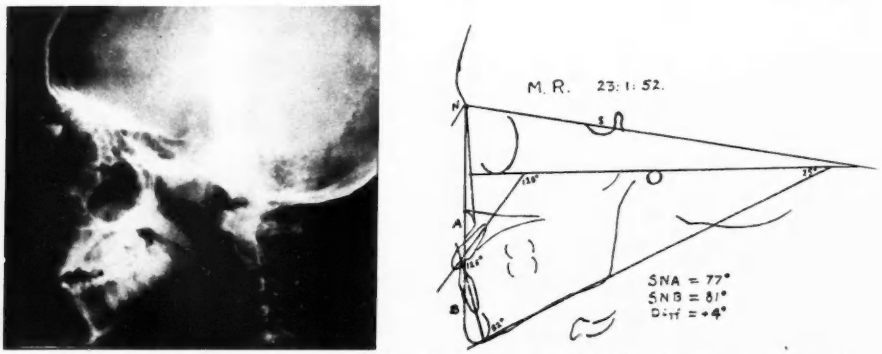

Fig. 4.—Lateral skull X-ray with tracing that illustrates a Type II skeletal pattern in association with a Class III (Angle) malocclusion. Cases are occasionally observed where the anteroposterior length of the maxilla places the apex of the maxillary incisors farther forward, so that the angle between the long axes of the upper central incisors and the Frankfort plane more nearly approximates the average of 107°.

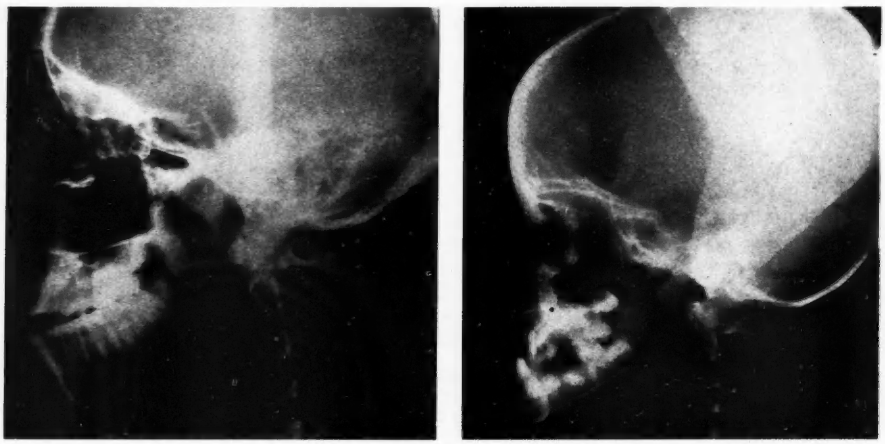

Fig. 5.—*Left*, Lateral X-ray of Class III (Angle) malocclusion on an intermediate type of skeletal pattern where the maxilla is well developed anteroposteriorly and the Frankfort mandibular plane angle is 42°. There was room for all the teeth in the maxillary arch without crowding. *Right*, Lateral X-ray of a Class III (Angle) malocclusion on an intermediate type of skeletal pattern where the maxilla was exceedingly short anteroposteriorly and contracted laterally in association with a mandible with a low gonial angle and a small Frankfort mandibular plane angle of 26°.

One further occlusal variation that should be mentioned in association with Type I skeletal patterns is a mesial displacement of the mandible that is the result of premature contact between the incisors as the mandible is moved from rest position into occlusion.

Now the other extreme morphological type, which from now on will be referred to as Type II, might be described as follows: the body of the mandible is long but the gonial angle is average or below average, and this is associated with a maxilla that is of average

length anteroposteriorly and not contracted laterally. This maxillary development means that the degree of mandibular prognathism is less marked than in the cases on Type I skeletal patterns. The intermaxillary space is about average and these patients tend to have round or square faces (*Fig.* 4).

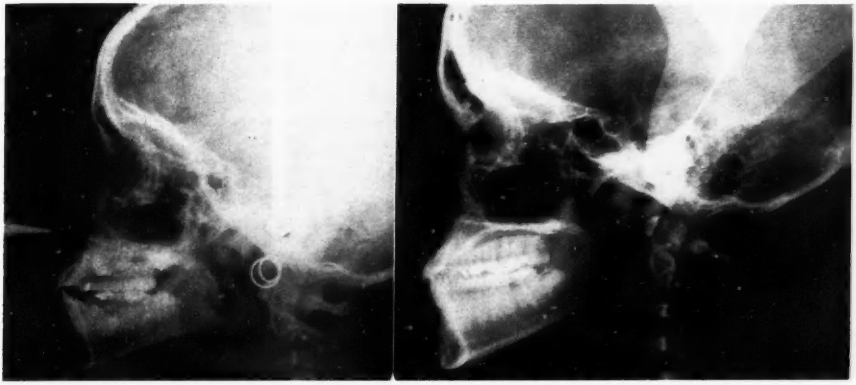

Fig. 6.—Illustrates considerable growth of both the dental base and dento-alveolar structures between the age of 9 years 2 months and 14 years exactly. The skeletal pattern originally was an intermediate type Class III.

Passing to soft-tissue variations, I think it is true to say that there are no typical muscle abnormalities whether of behaviour or posture that can be said to be regularly found in association with this type of dental base. The occlusal variations are, therefore, almost entirely the result of the skeletal pattern and, when the skeletal pattern does not vary greatly from the normal although the above characteristics are present, it is possible for a reasonably normal occlusion to result. It is not, however, uncommon to find that as the result of incisor interference the mandible is displaced mesially, so that the lower incisors are free to over-erupt to some extent. At the same time this displacement results in a partial over-closure, so that when the mandible is in rest position the inter-occlusal space in the posterior part of the mouth is wider than normal. This can probably best be explained on the ground that as a result of the over-closure the dento-alveolar structures in the posterior part of the mouth are not free to erupt to fill the intermaxillary space normally. I do not propose to go into the mechanism whereby the mandible is displaced mesially as a result of incisor interference since this has been discussed elsewhere, but it must be mentioned at this time since it is the commonest occlusal variation found in association with this type of skeletal morphology in Class III cases.

Between these two extreme types of skeletal morphology fall the great bulk of Class III cases that we see, and they are the result of the interplay between the skeletal pattern and soft-tissue behaviour and posture presented in each individual case, and, naturally, a wide variety of occlusal variations result. It is not possible to say that there is any one particular intermediate type that is seen more frequently than any other. Two intermediate skeletal types observed are illustrated in *Fig.* 5.

Before passing on to treatment one should mention that we occasionally see intermediate types of Class III cases where a study of serial radiographs suggests that bone growth is taking place at a greater rate than normally. The basal structures seem to grow forward relatively more rapidly than the cranial base so that bimaxillary prognathism becomes more marked. We have not observed cases where the mandible grows forward more rapidly than the maxilla so that mandibular

prognathism alone increases. A study of orthodontic text-books suggests that this relative increase in mandibular prognathism is frequently observed. We, however, cannot confirm this (*Fig.* 6).

Our approach to treatment is based on the principle that orthodontic treatment does not change dental base relationship and that soft-tissue patterning, while it does change, is somewhat unpredictable and may or may not be modified as the result of treatment. In Class III conditions where an over-closure factor is present, there is a change in the relationship of the mandible to the maxilla in centric that results from reducing the displacement, but we cannot demonstrate that it is possible to move a mandible mesially or distally as the result of orthodontic interference (*Fig.* 7). I do not mean by these remarks that we feel that we are in a position to be dogmatic about this but, for clinical purposes, this approach to the problem seems to be justified. When we come to soft-tissue behaviour we would be very unwise to be dogmatic, but the amount of change we can hope for as a result of our attempts to educate or modify it is possibly very small. It is true that patients can, by application and enthusiasm, overcome lip incompetence by teaching themselves to voluntarily hold their lips together and, when this happens, incisor relationships change, but patients are observed who have been able to do this for a time, gradually reverting to their fundamental behaviour patterns later in life and, as a result of this, incisor relationships changing back to what they would have been if the patients had never succeeded in compensating for their muscle abnormality. I think it is true to say that patients are less able voluntarily to control variations of tongue behaviour than they are lip posture and behaviour, and this fact, together with our inability to change dental base relationship, imposes considerable limitations on what we can do by orthodontic treatment for many types of Class III malocclusion.

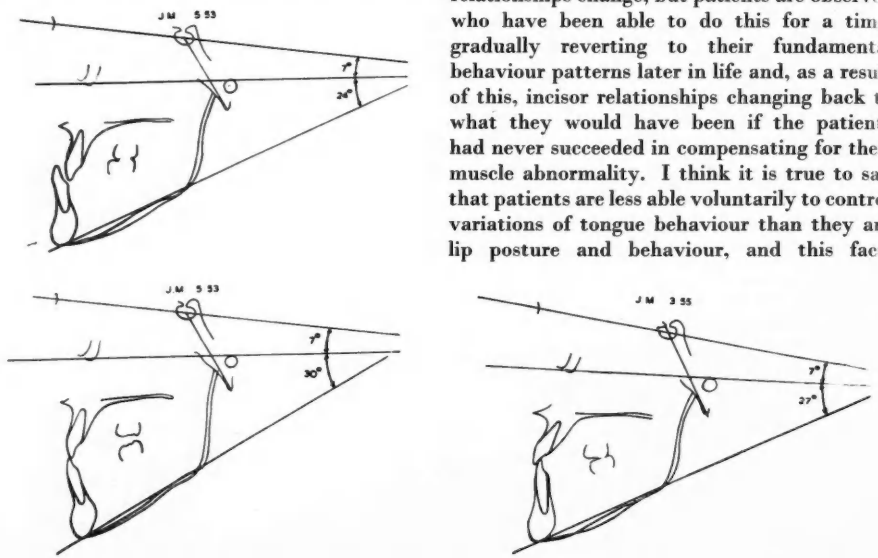

Fig. 7.—Illustrates the changes that have taken place in the skeletal pattern as a result of eliminating an over-closure factor as the result of orthodontic interference. There has been no change anteroposteriorly in the relationship of the mandible to the maxilla from its original rest position to the one found after treatment.

Usually treatment required to overcome occlusal variations in Type I cases is a reduction of crowding in the upper arch related to the small maxilla and the need to take the lower labial segment lingually so that it is placed normally behind the upper labial segment. The old empirical treatment for these cases which involved proclination of the upper labial segment, expansion of the upper arch, and Class III intermaxillary traction seldom produces a stable end-result. The proclined upper incisors will either collapse

owing to firm lip pressures and inadequate basal support or, if they should grow down over the lower incisors so that these teeth prevent them from dropping palatally, a displaced laterally off the dental base. It has been found from a study of many Class III cases treated in this way that maxillary expansion seldom remains stable. Arising

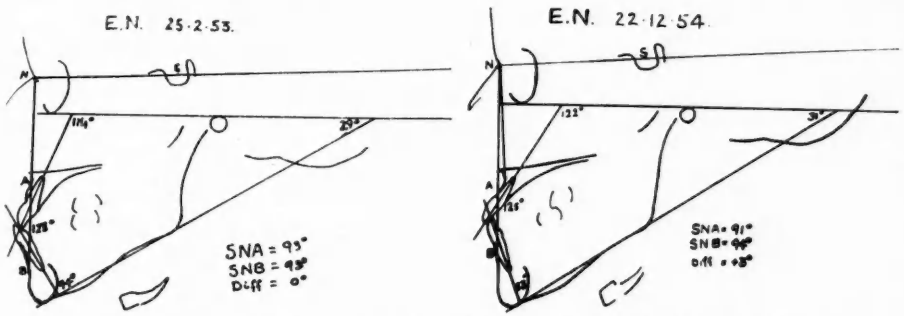

Fig. 8.—Tracings of lateral skull X-rays of a patient with a Class III (Angle) malocclusion on an intermediate type of skeletal pattern before and after treatment. There was a slight over-closure factor. Considerable tipping of the upper incisors labially and the lower incisors lingually resulted from treatment. $\frac{4}{4}$ were extracted. The incisors remained clinically loose after appliances were removed.

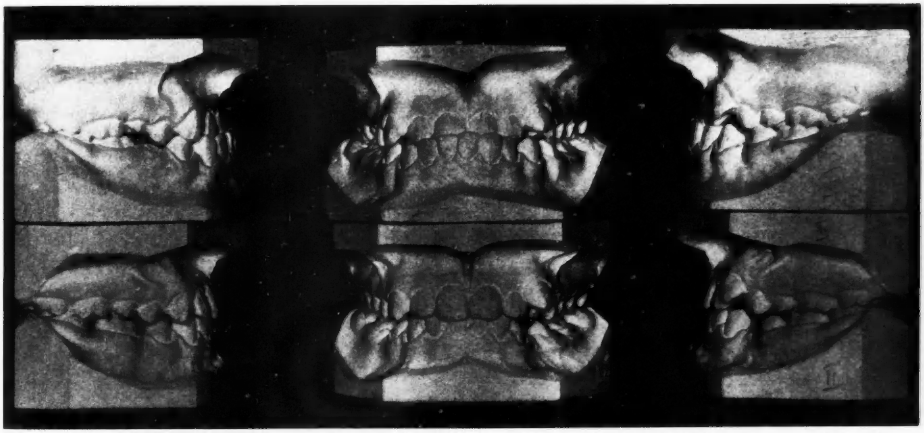

Fig. 9.—Models of case shown in *Fig.* 8 made on the same dates as the lateral skull X-rays were obtained from which tracings in *Fig.* 8 were taken. Although the position of the incisors has been improved æsthetically, their relationship is traumatic and the extraction of a tooth from the upper left buccal segment is probably contra-indicated for fear of losing the support of this buccal segment for the upper incisors which muscle pressures are attempting to position farther lingually.

traumatic incisor relationship will result. Expansion in the maxillary arch does not result in growth of the basal structures and, since we so frequently find the tongue postured in the floor of the mouth, there is seldom soft-tissue pressure on the lingual side of the upper teeth to hold the buccal segments from this it seems inevitable that the only possible treatment for crowding in the maxillary arch is the extraction of teeth and, if we are going to be successful in placing the lower incisors inside the uppers, these teeth must be tipped lingually and, to do this, it is almost invariably necessary to extract lower

premolars. If the tongue is postured in the floor of the mouth and we extract from the lower arch, we can only hope to retract the lower incisors the amount that they are pressures frequently prevent us proclining the upper incisors more than a degree or so, whereas the amount we can take back the lower incisors is something of an unknown

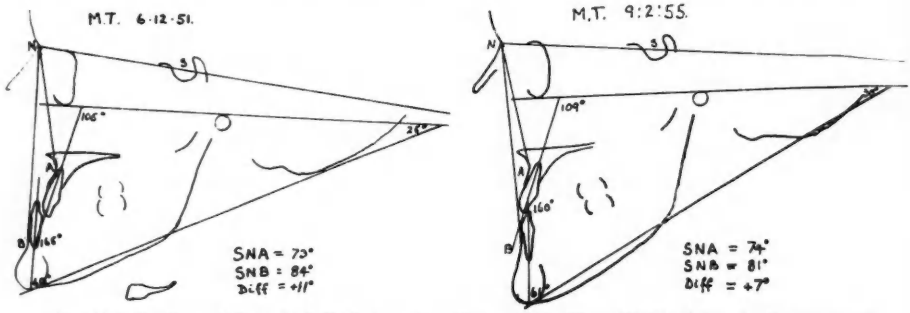

Fig. 10.—Tracings of lateral skull X-rays of patient with a Class III (Angle) malocclusion on an intermediate type of skeletal pattern before and after treatment. There was a slight over-closure factor. It was only necessary to tip the upper incisors labially a few degrees to overcome the mesial displacement of the mandible and the improved incisor relationship is not traumatic. $\frac{4|6}{6|6}$ were extracted.

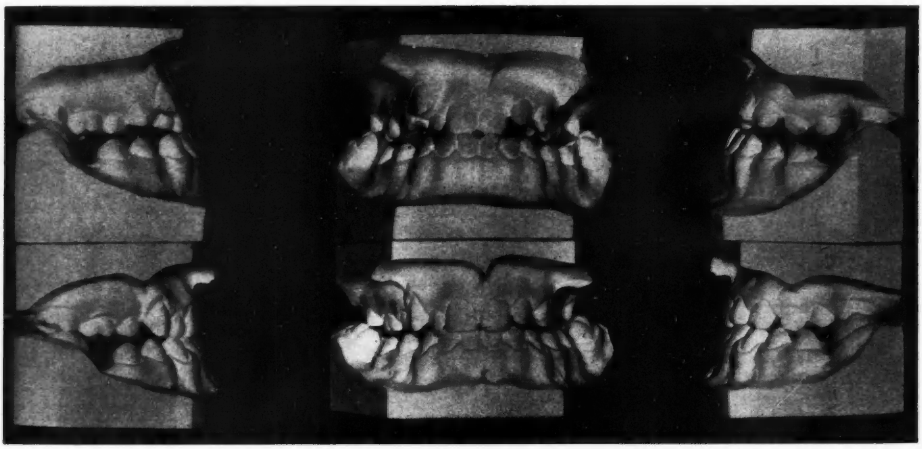

Fig. 11.—Models of case shown in *Fig.* 10. The upper models were made on April 4, 1951, and the lowers on May 29, 1953. Note that it was only necessary to tip the teeth in the upper labial segment forward a few degrees and that the upper buccal segments are supporting them. Incisors were clinically firm.

supported by the lower buccal segments. This means that we frequently cannot use space equivalent to a full premolar for the retraction of the labial segment because the tongue will only permit a few degrees of lingual tilt and we are left with residual spaces. Our problem, then, is exceedingly difficult. Soft-tissue quantity, and we must guard against producing an incisor relationship that is traumatic, which will lead to a gradual deterioration of the investing structures surrounding the incisors and, indeed, resorption of the roots of these teeth (*Figs.* 8–11). Prognosis, therefore, must be related to the degree of discrepancy

between the anteroposterior relationship of the upper and lower labial segments, this prognosis being worse as the discrepancy is more marked.

As I mentioned above, if the lower labial segment is not supported by the lower buccal segments as a result of skeletal and soft-tissue variations, the tongue being held in the floor of the mouth and the body of the mandible being long, extraction from the lower buccal segments cannot be expected to result in a retraction of the lower labial segment remaining stable, so that prognosis in a case of this type is very poor.

With the above generalizations about treatment in mind, I should like to end by describing some of the problems related to specific cases which might be taken as examples of a cross-section of Class III malocclusions that we see in practice. In the group of cases that fall roughly under the heading of Type I, the most common condition seen is maxillary crowding, with the lower labial segment placed in front of the upper labial segment with a unilateral or bilateral crossed bite. As I suggested above, expansion is rarely successful in those cases where the crossed bite is bilateral. In unilateral crossed-bite cases, however, especially if there is some lateral displacement of the mandible due to occlusal interference caused by a slightly contracted maxillary arch, it is possible, if a small amount of expansion is all that is necessary, to reduce the displacement and uncross the bite in this way. In the bilateral crossed-bite cases there is almost invariably crowding in the labial segment as well as the buccal segments, so that extraction from the maxillary arch is necessary to reduce incisor crowding. Since we probably cannot procline the upper labial segment to any great extent, extraction from the lower arch also is necessary and, if the incisor abnormality is not too exaggerated, appreciable improvement frequently results from the loss of the lower first premolars followed by a lingual tipping of the lower incisors. Residual spacing in the lower arch, for the reasons I have given, has to be reduced by bringing the lower buccal segments forward at the same time that the labial segment is taken back. Extractions from the lower arch with lingual tipping of the lower incisors does unfortunately leave the chin relatively more prominent in profile, which must be taken into account when deciding whether treatment is justified.

Where the lower labial segment is not in contact with the lower buccal segments in association with maxillary crowding, theoretically all that one can do is to reduce the maxillary crowding by extraction and place the lower labial segment farther back as a result of surgical interference. The difficulty with this procedure is that it tends to place the body of the mandible so far back if the incisor relationship is to be completely corrected that patients tend to acquire a somewhat chinless appearance, since you will remember that the middle third of the face is depressed in association with the small maxilla.

In those cases where a patient has an everted lower lip which is postured away from the labial surface of the lower incisors, extraction from the mandibular arch will result in our being able to hold these teeth farther back only if the patient can be persuaded to reduce the lip incompetence by holding the lower lip back against the incisors, and it is a fact that some patients do succeed in doing this. To what extent they relax later in life I am not prepared to say. So far as I am aware the long-term results of this have not been recorded. We have, however, seen cases where it has been possible to dismiss patients with greatly improved incisor relationships which appeared to be stable at the time.

In Type I cases we are sometimes faced with anterior open-bites with or without maxillary crowding which is the result of the deep intermaxillary space in the anterior part of the mouth, the patient only being able to obtain occlusal contact in the molar region. Experience has shown that it is difficult to elongate the upper and lower incisors to produce an over-bite as the result of mechanical interference. Usually the teeth just become loose and the further we attempt to move them the looser they become. When

this happens one is not justified in continuing treatment. It is a waste of time grinding the posterior teeth in an effort to allow the incisors to come closer together since the molars already fill the intermaxillary space and, as a result of the grinding, will simply

Fig. 12.—Illustrates a chin cap being pulled against the lower lip so that pressure is exerted against the lower incisors through the lip.

erupt a little further, so that the incisor relationship remains the same. Theoretically the extraction of a number of posterior teeth and placing dentures so short that they do not fill the intermaxillary space at the back of the mouth should allow the incisors to come closer together as a result of over-closure.

The other type of open-bite on Type I skeletal patterns was related to a tongue thrust during swallowing which held the anterior dento-alveolar structures from growing down to span the intermaxillary space. Almost invariably there is maxillary crowding in these cases so that extractions from the maxillary arch are necessary, and here if we extract lower premolars to enable us to take the lower labial segment back, the anterior open-bite increases as the reverse over-jet is reduced unless the tongue behaviour is modified. The prognosis for this is not good and these cases are not very amenable to treatment.

It is sometimes worth while taking a lower labial segment back at a fairly early age by using a headcap on traction to a chinstrap which is designed to exert a force through the lower lip against the lower labial segment. If the lower first deciduous molars are extracted it is frequently possible to retract the lower labial segment when the lower incisors are not too far in front of the uppers, and a marked improvement in their relationship can be brought about in this way. The extraction of the lower first premolars is envisaged at a later stage (*Fig.* 12).

The treatment of cases on Type II skeletal patterns where the Frankfort mandibular plane angle is less than average is easy or difficult in relation to the degree to which the lower incisors are placed labial to the uppers. As I said above, fairly normal occlusions with a reduced over-bite are encountered in this group, and the incisor over-bite is frequently the optimum that can be expected under the circumstances, and when this is the case an attempt to increase the over-bite is probably unwise.

If, however, the dental base relationship places the lower incisors well in front of the uppers and there is no mesial displacement of the mandible, extraction of two lower first premolars seldom permits us to tip the lower incisors back far enough to achieve a satisfactory incisor relationship, not only would the lower canines have to be taken bodily back for us to have space to tip the incisors lingually but the lower incisors would be unstable, to say nothing of being æsthetically unsatisfactory in that position. When this has been attempted it has also been found that it is impossible to close up residual spacing and that the lower second premolars fail to erupt to fill the intermaxillary space in the buccal region and remain in infraclusion. Prognosis then for the successful treatment of a pure Type II Class III case as the result of orthodontic intervention is poor, and here again surgery is the only answer in extreme cases. Fortunately this type of case is uncommon in this country.

If, however, there is a mesial displacement of the mandible as a result of incisal interference to the path of closure, theoretically one should attempt to take the lower incisors inside the uppers by moving these teeth lingually as much as possible rather than proclining the upper incisors. Associated with Type II skeletal morphology soft-tissue abnormalities are uncommon while the maxilla is relatively well developed, and it is therefore often possible to procline the upper incisors a few degrees and they will remain stable. What we must guard against is producing an incisor relationship that is traumatic as the result of over-proclinating the upper incisors which permits them to erupt so that the over-bite becomes deep enough for the lower labial segment to support the upper incisors farther forward than soft tissue related to the dental base will tolerate.

Fortunately many of these displacement cases are on relatively normal dental bases, so that a very mild proclination of the upper incisors is all that is necessary to reduce the displacement and produce a much improved incisor over-bite, and, since the amount of proclination is so slight, we frequently achieve a satisfactory result which is not traumatic.

Treatment of cases that present on the intermediate types of skeletal morphology can usually be approached logically if one bears in mind the two extreme types that I have described. It would be impossible in a paper of this kind to go into all the variations that we see. What I have tried to do is to focus attention on the need for careful diagnosis when considering the type of treatment that is likely to benefit Class III malocclusions and to point out why what one can hope to do for these individuals is usually little better than a compromise.

I am indebted to the staff in the Orthodontic Department of the Eastman Dental Hospital for allowing me to show cases from the departmental files and also to the Photographic Department for the preparation of the illustrations.

REFERENCES

GWYNNE-EVANS, E., and BALLARD, C. F. (1947), *Trans. Brit. Soc. Orthodont.*, 160.
RIX, R. E. (1946), *Dent. Rec.*, **66**, 103.

DISCUSSION

Mr. Chapman: I am glad to open the discussion on Mr. McCallin's valuable paper; its reading gives one much to think about; its treatment of the subject includes what may be called the newer thinking in orthodontics—the effect of soft tissues on occlusion; the earlier paragraphs give the impression that these, the soft tissues, were to be predominant, but, proceeding, one learns that the osseous tissue remains the fundamental factor and that must be borne in mind all the time.

Whether the soft tissues are as important as the paper implies, I have some doubt; it would be interesting to know in what proportion of cases they are a factor in the aetiology of Class III and what harmful effects on occlusion are to be attributed to them. It is only in very recent years that such close attention has been given to the soft tissues, yet there must be many successfully treated cases prior to this period, so the conclusion is that they, the soft tissues, are a factor in a minority only.

Mr. McCallin states that "soft-tissue patterning, while it does change, is somewhat unpredictable and may or may not be modified as the result of treatment". The repositioning of the mandible, whether backwards or forwards, implies that the soft tissues will be enabled to assume their normal relations—a definite benefit and a point in favour of changing the dental base relation. This leads to a point of some importance—great importance—and here there may be some divergence of opinion between Mr. McCallin and myself; it concerns the statement in the paper that "orthodontic treatment does not change dental base relationship" followed by "I do not mean by these remarks that we feel we are in a position to be dogmatic about this but, for clinical purposes, this approach to the problem seems to be justified". I want to draw particular attention to these statements because their implication is fundamental from the point of view of treatment and I want to state emphatically my belief, based on clinical experience, that the dental base relation (or arch relation, to use an older expression) can be changed: at the close of my remarks I will show a few cases in support of my contention.

There are two other points I want to discuss: the first is the great degree of inclination and proclination of the upper and lower incisors, which is implied in the paper, to bring about their correct labio-lingual relations. I would not have expected it possible that such changes could be permanent; in fact, Mr. McCallin points out, when speaking of "the old empirical treatment for these cases" that the "proclined upper incisors will either collapse" or "a traumatic incisor relationship will result". Yet the retraction of the mandible reduces the degree of both these possibilities, important points in favour of this plan of treatment compared with that described in the paper, which includes the considerable proclination of upper incisors and lingual inclination

of lower incisors. A change in the relation of incisors to basal bone is very prominent in the treatment of many types of cases to-day and I often wonder how stable they are—for my own part I have always been diffident of making such changes. I hope Mr. McCallin will bring examples to our notice.

The second point concerns extraction. The majority of Class III cases have good arches: in a few the upper is somewhat small but not the lower, which has a dental base large enough to contain all the teeth, so as a principle it is not desirable to reduce the amount of dental tissue in the maxilla (this is in contradistinction to Class II cases in which it is undesirable to extract in the lower). It rarely serves a useful purpose to extract a lower tooth; loss of an incisor will not necessarily permit greater inclination of the remainder; loss of a premolar only permits the remaining teeth to be moved mesiodistally round the basal bone without reducing the size of the dental arch and, as Mr. McCallin points out, spaces are created. But, if the mandible is retracted this problem of extraction does not exist; in addition, little or no proclination of upper teeth is required; once the labiolingual relation of the incisors is correct they adjust themselves.

Mr. McCallin's paper, whilst not dogmatic, does show a desire to change what has been regarded as orthodox treatment for many years; this is a recurring feature of orthodontic practice which implies dissatisfaction with the treatment of the past, as seen a number of times in "Orthodontics: Fifty Years in Retrospect". I am not convinced that all the changes proposed are improvements and I do hope our essayist will continue to treat cases by retracting the mandible, thus bringing the lower incisors into good relation with the upper incisors which, in a large proportion of cases, will require only small, if any, compensatory labial movement to obtain a result that will more than satisfy him and his patient.

Mr. Hovell said he would like to ask Mr. McCallin one question. He had said in his paper that he never expanded the upper arch because it would relapse. He agreed entirely and absolutely with this statement. He mentioned the Continental belief that it was possible to expand the maxilla and get bony deposition at the intermaxillary suture and he would like to hear Mr. McCallin's views on this. He thought that a lot of confusion over classifications came from the belief that in all Class III dental base relationships the incisors had Class III relationships. He would not enter into the controversy over the change of dental base relationships as everybody knew his views on the subject.

Mr. Kettle asked Mr. McCallin what he considered was the most important age in the growth of the jaws when the Class III abnormality manifests itself. There seemed to be differences of opinion in the rate of the growth of the palate and of the upper jaw and many authorities believed the most rapid growth was in the first five years of life. This did not seem to be borne out by clinical observations of Class III cases and he would like to hear Mr. McCallin's opinion.

Mr. Ballard said that he did not mind raising the question of dental base relationships. He thought it was about time that somebody pointed out that "we young naughty boys" did not think up something some years ago and have been trying to prove it ever since. We still use the appliances that Mr. Chapman uses, but we have not been able to show that with these appliances we can change the dental base relationship so we are not trying to prove something, we have proved it. Brodie and others, when they began their cephalometric analysis of treated cases, did not set out to prove that they had not changed the dental base relationship; they found as a result of their investigations that they had not done so and we have come to the same conclusion. He did not consider that producing slides of models before and after treatment was worthwhile evidence, a cephalometric analysis was essential. We would like to be able to change the dental base relationship; it would make our treatments much easier.

Mr. Hartley said whilst not wishing to dispute the term "interocclusal clearance" he wanted to know why Mr. McCallin had substituted this for the original term "free-way space".

Mr. Dickson returned to the question of rapid expansion of the maxilla and said that he had been fortunate enough to see a number of these cases which had been treated and the radiographs which went with them. He said that the two halves of the maxilla were quite positively moved apart by use of the cemented appliance. The two halves of the maxilla seemed to pivot on their connexions with the surrounding bones. He did not see any cases after appliances had been removed and so he was not able to say whether they relapsed.

Mr. Readings said that he thought that the dental base that Mr. Chapman was talking about was probably not the dental base that Mr. Ballard was talking about. He understood that Mr. Ballard referred to the apical base and he thought it was necessary to make a clear definition of what was meant by dental base. He would like Mr. McCallin to clarify this point as to whether he and Mr. Chapman were referring to the same dental base.

Mr. A. C. Campbell said that he wished to ask Mr. McCallin a question concerning the treatment of the younger child with a headgear and chin cap—similar to that used by Mr. Chapman. Sometimes when this type of apparatus was used on the point of the chin and not on the lower incisors through the lower lip, he wondered if it was not possible to produce a distorting effect similar to that which the Chinese used to produce in their women's feet by binding. It was known that during the growth of the mandible the condylar angle decreases; was it not possible that sometimes using such an apparatus we might be able to accelerate or exaggerate that reduction in condylar angle? He would like Mr. McCallin's views. He said that this paper had made a point of the skeletal and soft-tissue influence and he quoted a case shown by Tulley to the E.O.S. in 1953 where there was a skeletal III dental base with a normal occlusal relationship. An interesting point was that this boy had sucked his thumb up to the age of 16. Might not the thumb have some influence in maintaining a correct incisor relationship in cases with Class III tendencies?

Mr. Walpole Day commented on the possibilities of changing the dental base relationship. He wondered if Mr. McCallin was conversant with the work of Baker who had done experimental work on animals and demonstrated, to his mind, that it was possible to produce remodelling of bone. He considered the mandible to be a long bone with a cartilage at each end. If you put stresses on it you could alter its shape if not its size. He compared it with the bowing of the legs of the horseman who spent his lifetime in the saddle. He agreed with Mr. Chapman that you could not change the basal relationship by orthodontic means using the teeth as anchorage, but by occipital traction it was reasonable to assume that we could alter growth after a period of time.

Mr. Wilson said he would like to have Mr. McCallin's views on the fact that extractions in the upper arch would tend to produce Class III malocclusions. He said that Brodie's name had been mentioned in connexion with the lack of change in apical base relationship but he felt that recent publications from Brodie's Department showed that their views were being modified, particularly in relation to the treatment of Class II malocclusions when early treatment was advised. The same could apply in Class III cases. He asked Mr. McCallin what type of pressure and what type of elastics he used to get the rapid results he had shown in some of his cases. He felt that the arch and the condyle were very sensitive to pressure and that if pressure was applied to the chin point it was most likely to affect this growth centre. He felt that the evidence supporting the contention that the apical base relationship could not change was not complete. He accepted that gross discrepancies in jaw relationship could not be corrected completely, but with the not so gross cases he was convinced from his clinical experience that changes could be produced. He thanked Mr. McCallin for a very stimulating paper.

Mr. Watkin said he had Class III cases where he reduced the size of the tongue. Had Mr. McCallin any experience in this connexion? He said that the fact that spaces remained after extraction in the lower arch was because the tongue was too big. He said that to his mind there were two types of Class III. The pseudo-Class III which was really Class I, and the hereditary type of Class III where the mandible goes on growing. In discussing the question of surgical correction of these more extreme cases, it was necessary to reduce the size of the tongue in order to prevent collapse.

Mr. J. Campbell emphasized the remarks of Mr. Walpole Day on the work of Baker. He thought that Baker had demonstrated conclusively in his animal experiments that bone growth could be retarded on the side in which the occlusion had been disturbed. This restricted the development of the basal bone of the mandible, the maxilla, and to a less extent of the cranial bones.

Miss Clinch said that the argument seemed to be that as it is not possible to prove that we are able to alter basal arch relationship it was assumed that we were not producing changes. She thought that one should weigh against that the enormous amount of clinical evidence there is from people with wide experience that they are doing this every day in practice. They may be wrong, but she did not think they should be declared to be wrong until it could be proved that they are. She thought that also applied to the expansion of the arch. There seemed to be many who thought that it was not possible to expand the maxillary arch. She thought if you were treating a case in the deciduous dentition you could expand the maxillary arch and she was doing this every day in practice. She felt it was a necessity in treating an Angle's Class II successfully.

Like Mr. Wilson, she thought that there was definitely a difference if you treated the case early. She thought this was how a lot of the argument had started—that there were two schools of thought. There was one school who waited to commence treatment until the permanent teeth had erupted and the others who treated the case almost as early as they could. She did not think you could expand the arch with permanent teeth. Two of the cases which Mr. McCallin showed which he was sure were most stable were treated at an early age.

Mr. McCallin showed one case with an everted lower lip and said that unless the patient could be trained to keep his lip in a more normal position at rest the case would relapse. Would Mr. McCallin tell her if he considers the rest position of the lip more important than the position in function?

Mr. McCallin said that he did not wish to enter into this argument, if it could be called an argument, as to whether it was possible to change dental base relationship by orthodontic means. All the evidence published to date suggests that it is not possible, and those people who claim that they can produce a change have so far not produced evidence in support of this contention. They ask us to accept clinical evidence, in most cases from a study of serial models only, and he would suggest that they should apply the same criteria with the aid of serial lateral radiographs to their cases as we apply to ours. This would be his position in the matter in replying to Mr. Chapman's observations, and Mr. Ballard had made the same point. The serial models that Mr. Chapman had shown where Class III occlusions have been improved could be explained on the principle that there had been dento-alveolar changes with little repositioning of the basal structures. Some of them undoubtedly had exhibited a degree of forward posture of the mandible in their original position, and, as pointed out in the paper, they may well have been nearly normal as far as their dental base relationship was concerned.

Serial lateral radiographs did not indicate that the wearing of a chin cap caused repositioning of the mandible relative to the maxilla, and he wondered if the reason for improved incisor relationships following its use was the result of pressure exerted through the upper part of the chin cap against the lower incisor region on the alveolar part of the bone.

In answer to Mr. Hovell, he did not say that he never expanded the upper arch. In cases of unilateral crossed bite the small amount of expansion necessary was frequently maintained. However, he was disappointed with lateral expansion of the upper arch in Class III cases in order to increase intercanine width so that upper incisors could be alined.

In replying to Mr. Kettle he said he did not know whether there was a critical age when Class III relationship was likely to manifest itself. It was frequently seen in very young children and serial studies of untreated cases had not suggested that the mandible grows forward more rapidly relative to the growth of the maxilla at any particular age. He had a feeling that mandibular prognathism would not increase relatively with growth.

Replying to Mr. Hartley he said that it was J. R. Thomson himself who had changed the terminology from free-way space to interocclusal clearance as being a more descriptive term, and Mr. McCallin had found that it was easier for students to grasp the meaning of the expression if the new terminology was used.

Replying to Mr. Readings he said that what he and his colleagues referred to as the dental base was the mandible proper or the maxilla proper in which the apices of the teeth were situated. It ceased to be the dental base at the point where the dento-alveolar structures arose. He felt that Mr. Chapman was talking about the same thing as he was.

Replying to Mr. A. C. Campbell he thought that where abnormal pressures were used over a long period it was known it was possible permanently to alter the shape of a bone, but that the type of pressures exerted by orthodontic apparatus were nowhere near sufficient to have this effect. It was possible that a chin cap through which pressure was applied to the point of a

chin of a very young patient might distort the body of the mandible to some extent. He doubted whether this distortion remained permanent, and this could not be called changing dental base relationship.

He agreed with Mr. Campbell that the thumb undoubtedly influenced incisor relationship in the case he spoke of which was shown by Tulley in 1953, but he stuck firmly to the view that the changes resulting from these pressures were related to the dento-alveolar structures rather than to the base relationship.

He said he was afraid he could not answer Mr. Walpole Day or Mr. J. Campbell as he was unfamiliar with the data that they had quoted.

In replying to Mr. Wilson he agreed that extractions from the upper arch frequently resulted in a change in the relationship of the upper and lower incisors. For example, if one were to extract teeth from the upper arch in a case with a normal occlusion one would expect the over-bite to reduce and, indeed, the upper incisors might go lingually to the lowers if muscle pressures were typical. So far as the amount of pressure and pull of the elastics that he had used were concerned, he did not feel that the quantity of pressure was important so long as it was possible for a response to be obtained.

In reply to Mr. Watkins he said that he, too, had been involved in a reduction in tongue tissue in a case of bimaxillary protrusion and, although post-operatively the tongue was clinically much smaller, its behaviour and function were not modified. His feeling was that it was the way the tongue functioned that was important rather than its size. He said that his classification of Class III cases was in no way different from Mr. Watkins, but that they were simply expressing the same opinion in a different way.

In reply to Miss Clinch he felt that it was possible to explain the change in occlusal relationships observed clinically resulting from orthodontic treatment on the basis that the dento-alveolar structures had been repositioned upon the dental bases and that until evidence was forthcoming using the methods at our disposal with serial lateral tracings from lateral skull X-rays, or other methods as yet undescribed, it would be wise for clinical purposes to assume that the dental base relationship could not be modified. We all hope that evidence will be forthcoming that we are wrong about this.

So far as the case with the everted lower lip was concerned, he felt that Miss Clinch had not quite understood what he said. The point he made was that unless the patient learned to position the lip against the lower labial segment and hold it there, which would involve contraction of the mentalis muscle, the lower anterior teeth would come forward. Therefore the lip was not in rest in this position but in mild function.

THE USE OF CETRIMIDE B.P. AS A SOCKET DRESSING*

WITH AN INITIAL SURVEY OF 85 CASES

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THERE has been no real advance over recent years in the formulation of a harmless and efficient socket dressing. Penicillin and the sulpha drugs were promoted for some time but are now regarded as contra-indicated when used for this purpose (Franks, 1955).

Cetrimide has been used extensively in other therapeutic fields, but there do not appear to be any reports in the literature of its inclusion in socket dressings.

Rationale of a Socket Dressing.—

1. To preclude the establishment of infection and to treat it when present.

2. As a vehicle for obtundent drugs at the site of healing.

3. In elimination of dead space where blood-clot is deficient.

4. To arrest premature closing of the mouth of the wound and allow healing of the socket from the base.

In terms of practical application, a socket dressing is used in (*a*) post-operative care of surgical extractions, where there is a history of infection; and (*b*) treatment of dry socket.

Chemistry of Cetrimide.—Cetrimide—the synthetic quaternary ammonium compound, cetyltrimethylammonium bromide—is a creamy white powder, soluble in both water and alcohol. The solution in water exhibits high surface activity—a marked reduction in surface tension—and froths readily. The ion to which its detergent properties are due is the complex cation (Berry, 1951). Anionic detergents, e.g., soap, are chemically incompatible with the drug.

* This investigation was carried out while the author was at the Charles Clifford Dental Hospital, Sheffield.

Properties.—In vitro studies have shown that cetrimide is bacteriocidal and in high dilutions bacteriostatic, although not active against spores. It is most potent against Gram-positive and to a lesser extent against Gram-negative organisms.

Organic material, e.g., blood and pus, does inhibit its action, but Davies (1949) reports that this is not to a crippling extent. Using a 1 per cent aqueous solution in the presence of 90 per cent horse blood, he found the agent markedly effective against *Streptococcus pyogenes* and *Staphylococcus aureus* and that "A 0·1 per cent solution is also highly effective . . . providing the volume of antiseptic solution is ample to overcome the neutralizing action of any organic matter present". It has been noted (Barnes, 1942) that cetrimide *in vitro* precipitates serum-proteins and destroys leucocytes, the cells being completely broken up.

Reaction to Cetrimide.—The data available refers to its use on the skin. Barnes introduced the drug for medical purposes in 1942. After carrying out patch tests he expressed the opinion that sensitization to the chemical should not follow its occasional application on patients, and that there is no evidence that tissue damage follows its use on raw surfaces. Williams, Clayton-Cooper, Duncan, and Miles (1943) agreed that the risk is slight and in 1944, Williams, Clayton-Cooper, Faulkner, and Thomas recorded the routine hospital use of the drug for nine months without any report of allergy.

Three cases of dermatitis in a total of more than 2000 patients treated with cetrimide are reported by Colebrook, Gibson, and Todd (1945), but they quote McFarlane as not having had any reaction after using a 1 per cent solution on the skin of 2160 blood donors. By 1949 Cruickshank and Squire had collected 14 cases of reaction, but, considering its extensive and frequent use in industry and hospitals, it is felt that one can accept the sensitivity incidence figure of Colebrook and others (1945), i.e., 0·15 per cent, as a liberal estimate.

Formulation.—The pharmacy department of Imperial Chemical (Pharmaceuticals) Ltd. collaborated in an investigation of a suitable vehicle for the use of cetrimide in the mouth.

It was found that the paraffin/beeswax type of base (non-water-miscible) does not release a quaternary ammonium compound into water at 37° C. (Blagg, 1955).

The following water-miscible pastes were found to give a full release:—

1. Cetrimide 1 per cent in polyethylene glycol 400 — 1 part
   Carbowax 4000 — 1 part
   } Melting-point 47° C.
2. Cetrimide 1 per cent in polyethylene glycol 400 — 3 parts
   Carbowax 4000 — 1 part
   } Melting-point 41° C.
3. Cetrimide 1 per cent in polyethylene glycol 400 — 1 part
   Carbowax 1000 — 4 parts
   } Melting-point 30° C.

After initial trials it was found that Base 1 was of the most suitable consistency for use as a socket dressing.

Cetrimide has a bitter soapy taste and, although no flavour was used in the present survey, Burton (1951) gives detailed formulæ of various fruit flavours that can be added to mask the taste and which should satisfy the most discriminating palate.

CLINICAL TRIALS

A. Immediate Post-operative Application.—This group consisted of surgical removals—each patient having had a recent history of infection, e.g., pericoronitis.

First Visit.—A flap of mucoperiosteum was reflected in each case, it being designed so as to collapse into the socket after removal of the tooth.

The dressing was prepared as follows: A strip of $\frac{1}{2}$-in. sterile gauze tape was spread on both sides with the cetrimide paste and then rolled around dressing tweezers. On completion of the operation the dressing was inserted in the socket over the collapsed gum flap. The patient was given a pressure pack to bite on for 15 minutes and then dismissed for three days with instructions to use hot mouth-washes after meals and no other type of oral hygiene whilst dressings were in place. Isotonic saline solution was used for all irrigations and recommended for the home care.

Second Visit.—The gauze was removed and the socket irrigated. A new strip of cetrimide tape was inserted and the patient told to return in four days' time.

Third Visit.—The last dressing was removed and the patient loaned an irrigation syringe with instructions to keep the area clean with saline washes—to return in three weeks.

Fourth Visit.—Patient discharged.

RESULTS.—Of 22 cases treated in this survey, 17 were impacted lower third molars and 5 were retained roots in the same region. On the first return some degree of œdema, trismus, and post-operative pain were reported, depending upon the relative difficulty and time of the surgical intervention. After removal of the second dressing, the sockets were tested with a blunt probe and the walls appeared in each case to be covered by granulation tissue. Œdema, trismus, and pain were absent at the time of this inspection.

All 22 patients were discharged on the fourth visit with satisfactory healing.

B. Dry Socket.—The patients presented with the typical symptoms of dry socket—severe neuralgia, local inflammation, and a mushy semi-fluid clot.

First Visit.—The sockets were thoroughly irrigated with warm saline solution and a cetrimide gauze dressing (prepared as for A) was positioned in each socket. The patient was asked to return in four days' time.

Second Visit.—Dressing removed—socket irrigated. Patient put on self-irrigation with syringe—to return in three weeks.

Third Visit.—Patient discharged.

RESULTS.—Of 63 cases treated as above, 59 recorded freedom from symptoms at the time of the second visit. The other 4 patients had displaced their dressings at the day of insertion, but responded to a second application.

DISCUSSION

No concurrent control experiments have been carried out, therefore a strict scientific evaluation of the results is not possible. However, this small initial survey is merely intended to serve as an introduction to the use of the quaternary ammonium compounds post-operatively in the mouth.

The advantages of such material, e.g., cetrimide, used as a socket dressing, may be classified:—

1. It is a potent antibacterial agent—even at low concentrations—against most organisms found in the mouth.
2. It has a low degree of toxicity.
3. It is cheap and readily available.
4. It does not harden, and therefore is easy to remove.
5. The material is stable on storage.
6. The taste can be masked.

SUMMARY

The chemistry and properties of Cetrimide B.P. have been reviewed. A brief survey is given of the local use of the drug, as a post-operative socket dressing, in 85 patients.

Acknowledgements.—I would like to express my thanks to Professor G. L. Roberts for his encouragement and advice, and to Imperial Chemical (Pharmaceuticals) Ltd., for their co-operation in supplying samples of cetrimide.

REFERENCES

BARNES, J. M. (1942), *Lancet*, **1**, 531.
BERRY, H. (1951), *Mfg. Chem.*, **22**, 396.
BLAGG, G. L. (1955), personal communication.
BURTON, D. N. (1951), *Mfg. Chem.*, **22**, 267.
COLEBROOK, L., GIBSON, T., and TODD, J. P. (1945), *Med. Res. Counc. Spec. Rep. Ser. No.* 249, 14.
CRUICKSHANK, C. N. D., and SQUIRE, J. R. (1949), *Brit. J. indust. Med.*, **6**, 164.
DAVIES, G. E. (1949), *J. Hyg.*, **47**, 271.
FRANKS, A. S. T. (1955), The local use of penicillin and the sulpha drugs—a review (unpublished).
WILLIAMS, R. E. D., CLAYTON-COOPER, B., DUNCAN, J. MCK., and MILES, E. M. (1943), *Lancet*, **1**, 522.
— — — — FAULKNER, H. C., and THOMAS, H. E. (1944), *Ibid.*, **1**, 787.

Cavity Disinfecting Agents: A Survey

Bacteria may be found in clinically sound dentine following excavation of caries. Most of these can be killed by simple antiseptics, provided they can be reached. Silver nitrate still seems to be the most effective of these agents yet tested.—W. C. FEETKE (1955), *J. dent. Child.*, **22**, 105.

DENTAL PROBLEMS IN THE U.S.A.

An American public health dentist, L. Menezer, has written an interesting article in the *Journal of Dentistry for Children* (Vol. 21, No. 3, pp. 175–193). He attempted to find out the general attitude of the education authorities in America to the question of allowing children time off from school for private dental treatment. He found that a gradual improvement has taken place, but that the situation is still very difficult, because along with this improvement there has evolved a greater desire amongst the profession to treat children and a greater demand for this service from the parents. This means that although holidays are made full use of for treating children, some school time must also be used. In addition to this, the schools are making dental hygiene an important part of the school health programme, and this is also increasing the demand for children's dentistry.

Questionnaires were sent to superintendents of schools of all cities with a population of 90,000 or more; 94 replies were received to 125 letters. The problem is obviously of great interest to the schools, because not only were the forms fully completed but many replies included letters describing personal views and local difficulties.

To the question, "Are students in your school system excused during the school day to visit a private physician or dentist?" about 65 per cent said "Yes", and 18 per cent said: "Only under special circumstances", and the rest said "No". From the question, "Does any legislation (State or local) or school policy exist specifically authorizing the absence of children from school for this purpose?" it was learnt that only the State of California had definitely laid down that schoolchildren must be released to see private dentists during school hours. Several other States leave the decision to the school authorities, whilst at the same time encouraging such a policy.

Several of the educational authorities have attempted to co-operate with the local private practitioners on this matter. Together they have drawn up a form on which the dentist writes the times of the patient's arrival at, and departure from, his surgery, and the teacher the time of the child's departure from, and arrival back, at school. The parent's consent is also obtained on the form to cover legal difficulties, and most of them also include a section for the dentist to write the time and date of the next appointment. This seems to be a practical method of dealing with the problem. Some authorities limit the number of dental appointments a child may have during any one term; however, this method has obvious limitations.

To the question, "What objection, if any, do you see as an administrator in permitting a child to leave school during the school day in order to receive private medical and dental treatment?" a variety of answers was received. These ranged from "None, it is just good common sense", to "It is an encroachment upon the child's educational opportunities to accommodate the medical or dental profession".

The similarity of the problem in both countries is shown by this statement made by Menezer. "It is rather contradictory that permitted absenteeism to attend clinics is both acceptable and desirable, yet in some cases there is opposition to releasing a child in order to keep a private appointment".

It is interesting to learn that America has such a similar problem to our own, and the fact that this rather lengthy article has been written shows that it is of considerable importance over there. It would appear that dental problems in the States are of more general importance to the lay public than in this country, and it will be of interest to see if and how they solve this one.

P. J. Holloway.

PRIVATE SECRETARIES APPOINTED

The Minister of Health has appointed Mr. W. M. F. Vane, T.D., M.P., to be his Parliamentary Private Secretary.

The Minister of Pensions and National Insurance has appointed Commander R. Scott-Miller, V.R.D., M.P., to be his Parliamentary Private Secretary.

OCCLUSAL-PROXIMAL CAVITY PREPARATION IN THE DECIDUOUS MOLAR

By **J. L. HYETT**, L.D.S.
Department of Conservative Dentistry, Children's Section, London Hospital Dental School

GENERAL CONSIDERATION

THE preparation of the occlusal-proximal cavity (Black's Class II) in the deciduous molar necessitates certain modification of the form acceptable for similar cavities in the permanent teeth. This is because the coronal areas of the dental pulp of the deciduous teeth

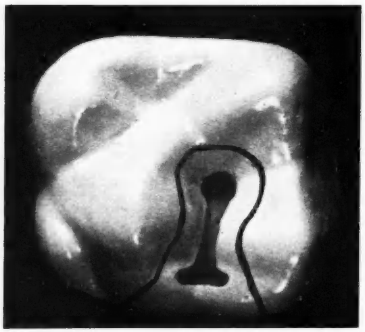


Fig. 1.—E showing outline of distal cavity with occlusal defects traced out to a depth just below the amelodentinal junction and extended distally towards, but not including, the marginal ridge of enamel.

are usually larger, in proportion to the size of the crown, than those of the permanent teeth. It should also be remembered that an over-extension of a pulpal horn into the cusp area occurs more frequently in the deciduous dentition. Bite-wing radiographs are of considerable value in the determination, not only of the extent of the caries but of the position of these pulpal horns. This class of cavity in the deciduous molar must, therefore, be made shallow so that the danger of exposing the relatively large coronal pulp during preparation can be substantially reduced.

CAVITY PREPARATION

1. Outline Form.—

The Occlusal Step.—The distance the occlusal step is extended mesially or distally depends upon the occlusal surface anatomy of the deciduous molar concerned. It should include all carious areas, pits, fissures, and retention grooves. Transverse and oblique ridges that are not undermined by caries should not be included in the preparation. A No. 1 round bur is used to trace out all these defects to a depth just below the amelodentinal junction. A No. 2 or 3 inverted cone bur is then used to flatten the pulpal wall and extend the occlusal step mesially or distally towards, but not to include the thin marginal ridge of enamel (*Fig.* 1).

The Proximal Box.—A No. 1 or 2 round bur is then placed in the handpiece and held almost parallel to the long axis of the tooth. It is inserted into the occlusal cavity and then brought close up under the marginal ridge and directed into and through the proximal carious area until sound dentine is reached at its gingival aspect (*Fig.* 2). The bur is then moved in a buccolingual direction until sound dentine is again reached on either side of the carious area. The marginal ridge and proximal enamel wall remains intact and thus helps to protect the adjacent tooth from bur damage. A No. 1 or 2 fissure bur can then be used to extend the proximal box in a buccolingual direction and taper the buccal and lingual outline to parallel the buccal and lingual external surfaces of the tooth. The proximal enamel and marginal ridge should be removed with sharp enamel chisels following the cleavage lines of the prisms. Any remaining caries is then removed with small spoon excavators.

2. Resistance and Retention Form.—

The Occlusal Step.—The occlusal step should be slightly "dovetail" in shape and contain gently rounded corners. The occlusal isthmus should be relatively wide, approximately one-third to one-half the width of the buccolingual surface area. It is in this respect that the Class II cavity in the deciduous molar differs

most from a similar cavity in a permanent tooth. Failure of the amalgam filling in deciduous teeth most often occurs at the junction of the occlusal and proximal portions,

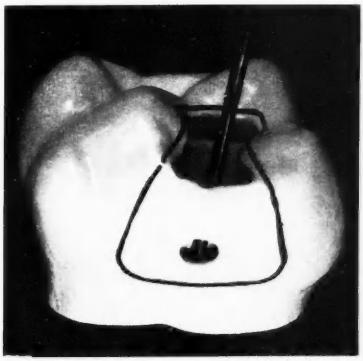


Fig. 2.—The outline form of the occlusal step has been almost completed. The pointer indicates how the No. 1 or 2 round bur is brought close up under the marginal ridge and directed into and through the proximal carious area.

and since thickness must be sacrificed if the pulp is not to be endangered, as much width as possible is given to the isthmus. It is also essential to strengthen the filling by ensuring that the pulpo-axial line angle is rounded and not a right angle. Finally the occlusal step should be slightly undercut and the enamel margins trimmed with sharp chisels to remove any small irregularities and loose enamel prisms.

The Proximal Box.—The buccal and lingual walls of the proximal box should be extended with the aid of a No. 1 fissure bur and enamel chisels until the margins of the cavity exist in self-cleansing areas, care being taken to avoid damage to the enamel of the adjacent tooth while using the bur. When viewed from the occlusal surface the planes of the buccal and lingual walls should form an angle of approximately 90° with each other. The proximal outline should be parallel to the buccal and lingual external surfaces of the tooth and hence the box will have greater gingival than occlusal width. The gingival wall should be flat and at right angles to occlusal stress and extend with a self-cleansing environment, which will usually be just below the free margin of the interdental papilla. Retention grooves should then be cut at the axiobuccal and axiolingual line angles with a No. $\frac{1}{2}$ round or tapered fissure bur. These greatly help to

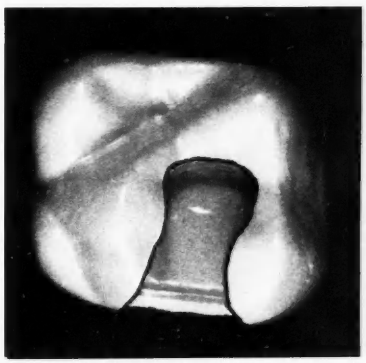


Fig. 3.—Occlusal view of completed disto-occlusal cavity in $\underline{E}$.

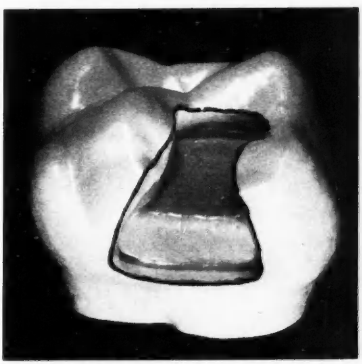


Fig. 4.—Proximal view of completed disto-occlusal cavity in $\underline{E}$.

retain the proximal portion of the amalgam filling and relieve the strain from the isthmus of the occlusal step. The cavity is then completed by trimming with enamel chisels and gingival margin trimmers (*Figs.* 3, 4).

ISOLATION

The tooth can best be isolated by the use of cotton rolls, often cut in half to fit more comfortably in the child's mouth, held in position by finger pressure, or if an infiltration

anæsthesia of 2 per cent xylocaine is used, a suitably adapted wool roll clamp will probably be more satisfactory.

Acknowledgements.—My thanks are due to Mr. A. M. Horsnell, Director of Conservative Dentistry, and to Mr. P. Broadberry, of the Photographic Department, The London Hospital.

BIBLIOGRAPHY

BRAUER, J. C., and others (1952), *Dentistry for Children*. London: Henry Kimpton.
MASSLER, M., and BARBER, T. K. (1953), *Manual of Pedodontics*. University of Illinois.

DORRANCE PUSH BACK APPLIANCE

By **A. C. ROBERTS, F.I.D.T.**
Dental Department, Royal Victoria Infirmary, Newcastle upon Tyne

THE Dorrance appliance is a mechanical aid to give support in a secondary repair for cleft palate when a primary operation has failed to give sufficient length to the soft palate.

When an operation for closure of a cleft palate fails to give sufficient length to the soft palate to close off the nasal cavity from the oral cavity food can pass upwards during speech, and air can enter the nose and give a nasal tone and make the speech indistinct.

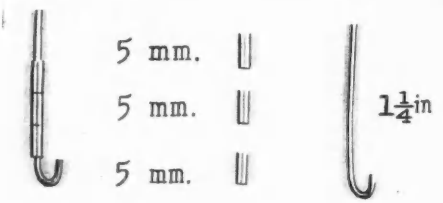


Fig. 1.—Two rod-and-tube combinations with the gauges required.

It is, therefore, necessary for such patients to undergo a second operation designed to push back the soft palate and soft tissues covering the hard palate towards the pharyngeal wall, in an endeavour to give sufficient tissue to allow the two cavities, the nose and the mouth, to be separated at will.

The deficiency in the mucous membrane of the hard palate will be made good by the growth of epithelium from the edges, of the defect which is left, once the soft tissues have been placed in their new position.

The defect left in the hard palate is of no great concern to the surgeon at this stage; it can be filled by an obturator at a later date.

The operation is performed in two stages. At the first operation the mucoperiosteum is elevated, the palatine vessels are divided, and a split-skin graft is sutured to the raw surface of the mucoperiosteal flap, which is then sutured back to its original position. Three to ten weeks later, when collateral circulation is established, the mucoperiosteum is again elevated and slid back posteriorly, so that the distance between the soft palate and the posterior pharyngeal wall is diminished sufficiently to allow for functional closure of the palatopharyngeal sphincter. It is at the first stage that the appliance is used to give support to the sutured soft-tissue flap.

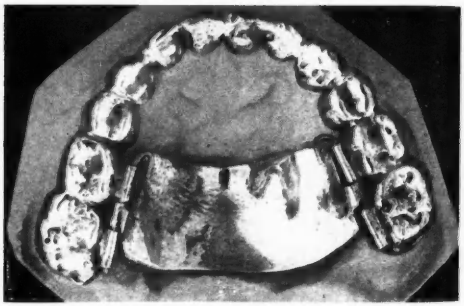


Fig. 2.—The tube combinations in position on the finished appliance.

CONSTRUCTION

First of all a composition impression is taken and a special tray constructed. A new impression is recorded, again using composition. The reason for the use of composition in preference to an alginate impression material

is that the undercuts are not required as they make difficult the removal of the wax pattern during construction, and also the fitting of the metal cap splint.

The impression material does not need to extend on to the soft palate. The model is cast in a stone-hard plaster, and the gingival margin trimmed to a depth of 1 mm. to enable the splint to fit below the gingival margin to stop food debris collecting. A gauge-6 casting wax is then adapted to the teeth, care being taken to make sure that the wax is well adapted to the occlusal surface and interdental spaces, therefore gagging the bite as little as possible; the wax is then trimmed around the gingival margin. Next 0·1-mm. nickel-silver tubing is cut into lengths of 5 mm. and localized with each other by means of a rod of 0·1-mm. stainless-steel wire about $1\frac{1}{4}$ in. long, with a loop at one end to act as a stop; this loop also acts as a grasping hook for removal and insertion of the rod into the tube (*Fig.* 1).

Two of these rod-and-tube combinations are made and waxed to the palatal surfaces of the 76|67 on the wax splint pattern with the rods in situ, leaving the palatal surfaces of the tubes free from wax. The tubes must be horizontal and not encroach on the tongue space; the rods should be tested for removal and insertion. The technician should bear in mind the fact that the rods are to be inserted inside the mouth with the grasping hook towards the palatal surfaces of the anterior teeth, and unobstructed insertion is essential.

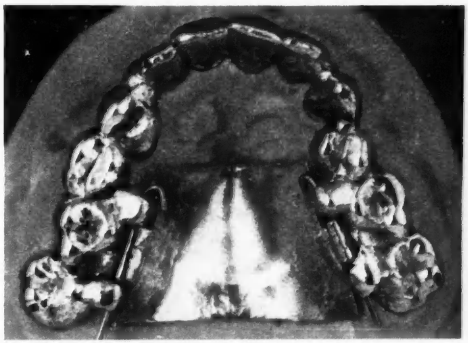


Fig. 3.—Tube combinations localized, permitting the rods to be inserted into the tubes anteriorly to hold the plate in place. The rods project $\frac{1}{2}$ in. to allow for bending over when the plate is fitted.

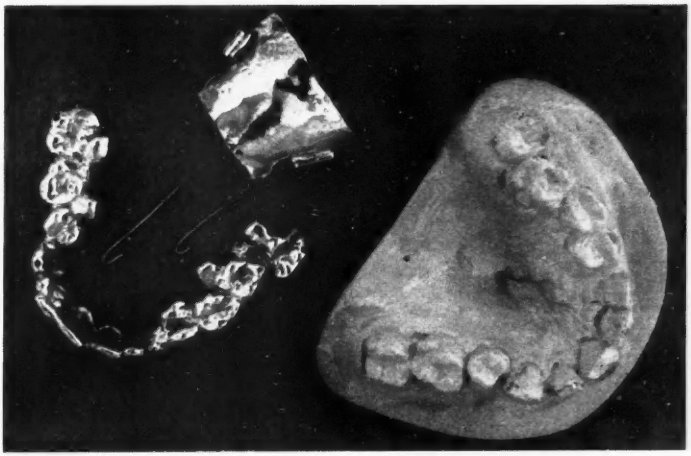
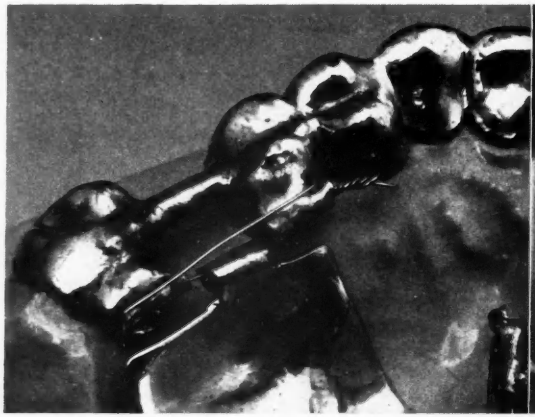
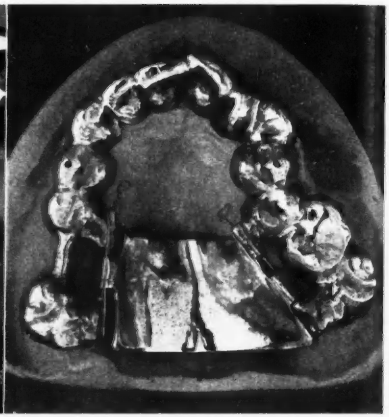


Fig. 4.—Component parts.

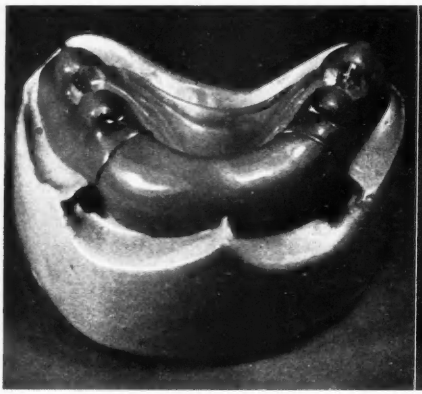
The rods and tubes are now carefully removed from the wax pattern so that they leave an impression or bed; the splint is sprued, removed from the model and invested then cast in copper-silver alloy. The sprues are removed and the casting filed and polished, care being taken to preserve the detail of the

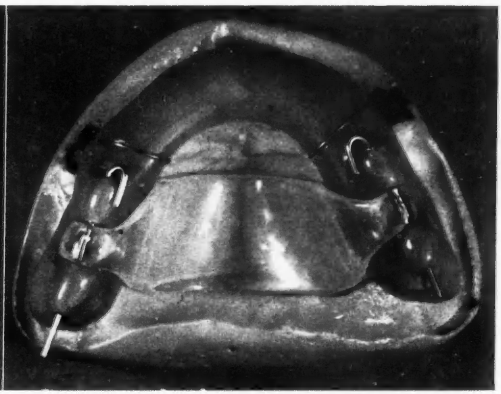
bed made by the tubes during waxing up. The polished splint is then fitted on to the model, the tubes being fitted back into their beds, with the centre left free. The beds for the tubes may need easing to ensure a snug fit.





Figs. 5, 6.—Wires used to fix supporting plate; one coiled end is projecting for photographic reasons —normally it would be tucked away to avoid trauma to the tongue.





Figs. 7, 8.—Appliance constructed in acrylic resin for edentulous patients, with peralveolar wires in the $\frac{65}{46}$ region.

When the tubes are placed remove the rods, leaving the two end tubes held in their metal beds; the ends are then filled with an antiflux, such as whiting, the splint is removed from the model with the four tubes in situ, and soldered, using silver solder. The soldering may be carried out freehand, as the tubes are held firmly in place. The antiflux is removed, and the splint replaced on the model, the centre tubes are replaced and localized with the rods. Next a piece of modelling wax is placed over the palate, trimmed so that it is 1 in. in width, just encroaching on the soft palate, and just below the tubes on the splint, and french chalked; this wax is to relieve the area of the supporting plate so as to give room for a dressing over the sutured muco-periosteum.

A gauge 8 casting wax is adapted to the modelling wax relief and trimmed to the same size; it is also trimmed around the tubes. The

centre tube is waxed to the pattern so that on removal it will leave an impression of the tube on the wax plate. The pattern is sprued and removed, then cast in copper-silver alloy, after which the sprues are removed and the casting filed and polished. The centre tubes are disengaged from the rods on the splint and slid into their beds on the supporting plate, the ends are filled with an antiflux, and the tubes soldered to the plate. The antiflux is removed from the ends of the tubes and both splint and supporting plate repolished to remove any oxidation caused by soldering the component parts. The splint is placed on the model and the supporting plate in its position across the palate. The tubes will now be localized, permitting the rods to be slid into the tubes anteriorly to hold the plate in place (*Fig.* 3). The rods should project about $\frac{1}{2}$ in. beyond the posterior tube to allow for bending over when the plate is fitted, thereby preventing them from becoming detached. It has been found difficult to bend 0·1-mm. wire in the mouth, but this can be overcome by annealing the region of the rod to be bent.

FITTING THE APPLIANCE

The cap splint is cemented to the teeth with Black copper cement 24 hours before the patient is due in the operating theatre. The supporting plate is not attached at this stage and can be degreased with 1 per cent Cetavlon to await sterilization for fitting in the theatre.

The plate is fitted at the end of the second stage of the push-back operation—that is after the freed mucoperiosteum has been slid back posteriorly and sutured. The supporting plate is fixed in position and the rods are bent over. The patient wears the appliance for about fourteen days, during which time one rod may be unbent and removed and the supporting plate pulled aside for examination from time to time. The other rod-and-tube combination acts as a hinge for the elevated plate during examination, at the end of which the plate is fixed back in position. It will be found difficult to withdraw an unbent pin if kinks are present; the alternative to using hard wire rod for supporting plate fixation is soft stainless-steel wire of 0·25 mm. (*Figs.* 5, 6 show wires used to fix the supporting plate. One coiled end is projecting for photographic reasons; normally it would be tucked away to avoid causing traumata to the tongue.)

This wire can be bent and removed easily, kinks having little or no effect on its withdrawal from the tube. The wire may be used in strips 4 in. long with one end twisted to form a loop, the free end is passed through the tubes and bent over at the posterior tube and brought back through the loop at the other end and made firm by twisting the loops and free end together with Spencer Wells forceps.

EDENTULOUS CASES

If the patient requiring a Dorrance push-back appliance is edentulous then the appliance is constructed of acrylic resin (*Figs.* 7, 8) and consists of a baseplate and supporting plate. The supporting plate is attached by means of two rod-and-tube combinations, as in *Fig.* 1. The tubes should have some means of retention attached in the form of a wire loop, or the surface serrated, to hold them firmly in the acrylic. The palate is left free from acrylic enough to allow the mucoperiosteum to be elevated. The supporting plate can be made of clear acrylic to allow for examination of the graft without removing the plate. The area of the supporting plate should be relieved as with the metal appliance. The appliance is retained in the mouth by peralveolar wires, using 0·25-mm. soft stainless-steel wire; grooves are made on the periphery and the ridge of the baseplate in $\frac{65}{56}$ region to prevent the wire from sliding. The palatal periphery of the baseplate acts as a guide for the exit of the bradawl when the surgeon is piercing the alveolus to take the wire. The coiled end of the wire is tucked away in the buccal sulcus, and gutta-percha may be placed on the coiled end to stop irritation.

Acknowledgements.—The author wishes to thank Mr. F. Braithwaite, O.B.E., M.A., M.Sc., M.B., B.Chir., F.R.C.S., and Mr. G. Bennett, F.D.S. R.C.S. (Edin.), Senior Registrar, for permission to publish this communication and for help in the preparation of the article; and to Mr. Finlyson for the photographs.

BOOK REVIEWS

THE DESIGN AND CONSTRUCTION OF REMOVABLE ORTHODONTIC APPLIANCES. By C. PHILIP ADAMS, B.D.S., F.D.S., D. Orth. $9\frac{3}{4} \times 7\frac{3}{4}$ in. Pp. 96, with 144 illustrations. 1955. Bristol: John Wright & Sons Ltd. 17s. 6d.

MR. ADAMS'S name must be known to all who include orthodontic treatment in their practices, and this book, based on a series of his articles from the DENTAL PRACTITIONER AND DENTAL RECORD, is most welcome. A fresh chapter discussing the several factors which affect the design and construction of a removable appliance has been added. Any classification of orthodontic appliances tends to be cumbersome and the difficulty here is overcome by classifying according to types of tooth movement. There has been no mutilation of the language and the text is easy to read from the early chapters on principles and design through to the technique of constructing clasps and springs and their application to nearly every orthodontic need. If any text can teach wire bending this is it. The line drawings and photographs are strikingly clear and they far outnumber the pages. This book is sound common sense from one who is not only experienced in the practice of his art, but well versed in the physical and the biological principles on which it depends.

J. S. B.

BRITISH STANDARDS INSTITUTION, ANNUAL REPORT 1954–5. Pp. 243. London: British Standards Institution. 5s.

A NOTICE of this publication in a journal for the dental profession must necessarily refer to the important fact that it gives details of the first specification issued under the authority of the Dental Industry Standards Committee. This specification is for acrylic resin denture base. Work is in hand on acrylic teeth, acrylic filling materials, dental amalgam, and hand cutting instruments. The existence of this standard is heartening in itself and as marking the achievement of those who have worked so hard to bring this committee into being, but it is important to notice that this is not only an agreed specification but also that it is published with the backing of this most potent body, the British Standards Institution. This report tells of the multitude of the industries and interests that compose it and agree to accept judgements in its name, of the way in which they are integrated, of the growing volume of its work, and, finally, of its international influence and contacts.

Participation in its work should bring nothing but good to dentistry. The reputation of those who compose the committee is an augury for its success, and it is a pleasure to see that Dr. Marie Gayler has consented to join them.

F. F.

EXAMINATION RESULTS

UNIVERSITY OF MANCHESTER

December, 1955

The following students have satisfied the examiners:—

Degree of Bachelor of Dental Surgery (*Final Examination, Part I*):—

Bullock, J. A.; Jefferies, Gordon; Watson, John; Yates, Annie H.

Awarded Distinction in Senior Operative Dentistry: Jefferies, Gordon.

Awarded Distinction in Prosthetic Dentistry: Bullock, J. A.

The following has satisfied the examiners *at L.D.S. Standard*:—Taylor, G. L.

Degree of Bachelor of Dental Surgery (*Final Examination, Part I*):—

Galbraith, J. M.; Rothwell, P. S.; Sawyer, J. A.; Schofield, Peter; Smith, Edwin.

Diploma in Dentistry (*Final Examination*):—

Ashworth, Robert; Flitcroft, J. C.; Hanley, J. M.; Hougie, Edward; Hurst, Jacqueline; McWalter, K. C.

Diploma in Dentistry (*Final Examination, Part I*):—

Burscough, Francis; Coups, M. G.; Davies, A. K.; Gibson, Harold; Gravely, J. F.; Greenhalgh, James; Heyworth, Jenefer M.; Higham, R. F.; Hughes, J. P.; Le Coyte, D. F.; Lukeman, J. D.; Marchington, J. P.

Degree of Bachelor of Dental Surgery (*Third Examination*):—

Booth, J. M.; Dixon, B. G.; Eccles, W. G.; Roberts, T. D.; Seel, Derek.

Degree of Bachelor of Dental Surgery (*Second Examination*):—

Beardmore, W. A.; Charlesworth, A. F.; Lomax, G. W.; ten Bruggen Cate, H. J.; Worrall, V. H.

Diploma in Dentistry (*Third Examination*):—
Barker, J. R.; Davison, D. J.; Greenhalgh, James; Hartley, G. J.; Heyworth, Jenefer M.; Hughes, J. P.; Le Coyte, D. F.; Monks, W. J. M.; Moody, A. J.; Nuttall, A. J.; Schindler, B. J.; Sedgwick, A. V.; Wood, Geoffrey; Worrall, J. A.

Diploma in Dentistry (*Second Examination*):—
Abbott, W. J.; Barrand, J. D.; Bridge, J. D.; Dickson, W. L.; Lord, W. R.; Morgan, R. V. J.; Smith, W. A.; Thompson, P. V.

THE UNIVERSITY OF LIVERPOOL
December, 1955

The following students have satisfied the examiners:—

Degree of Bachelor of Dental Surgery (*Final Examination, Part I*):—
Barlow, D. J.; Galliford, I.; Gilbert, J. W.; Lloyd-Williams, Margaret J.; McCracken, J. G.; Roberts, Olive; Tobin, R. J.; Yearsley, Susan.

Licence in Dental Surgery (*Final Examination, Part I*):—
Barron, D. W.; Crookall, R. F.; Golding, A. A.; Hall, C. M.; Hutchinson, R. R.; Issa, H. I.; McAllister, D. H.; Magee, H. C.; Naess, T. K.; Petty, B.; Ryan, J. F.; Simkins, W.; Sowerby, C. A.; Thom, I. H.

Degree of Bachelor of Dental Surgery (*Second Examination, Part II (a)*):—
Danchin, N.; Llewellyn, R. L.; Roberts, Olive.

Licence in Dental Surgery (*Second Examination, Part II (a)*):—
Davies, W. B.; Downer, M. C.; Hernaes, Ingrid K.; Kent, R. F.; Powell, F.; Rader, A.

Degree of Bachelor of Dental Surgery (*Second Examination, Part II (b)*):—
Cunliffe, J. J.; Danchin, N.; Llewellyn, R. L.; Vega, G. A.

Licence in Dental Surgery (*Second Examination, Part II (b)*):—
Connor, V. A.; Davies, W. B.; Downer, M. C.; Dyer, J. L.; Hernaes, Ingrid K.; Petty, R.; Powell, F.; Rader, A.; Williams, H. R.; Wookey, C. P.

UNIVERSITY OF DURHAM
December, 1955

The following students have satisfied the examiners:—

Degree of Bachelor of Dental Surgery (*Final Examination*):—
Phillips, Miss J. H.

Degree of Bachelor of Dental Surgery (*Final Examination, Part I*):—
Dixon, J.; Paterson, A. K.; Rigby, F. R.; Ward, K. A.

Licence in Dental Surgery (*Final Examination*):—
Gell, F. E.

NATIONAL HEALTH SERVICE NOTES

General Dental Services

The National Health Service (General Dental Services) Amendment (No. 2) Regulations, 1955, amend the existing Dental Regulations in the following four minor respects.

1. *Period for which dentists can be required to produce Dental Record Cards*: This amendment brings the Regulations into line with the arrangement described in E.C.N. 174 under which limits were placed on the periods within which dentists can be required to produce records to the Dental Estimates Board, the Council, Local Dental Committees, and Dental Officers. These periods are:—

(i) for treatment on estimates requiring the Board's prior approval, four years after the end of the financial year ending March 31 in which payment was made;

(ii) for other treatment, two years after the end of the financial year ending March 31 in which payment was made.

Although dentists will not be asked to produce records beyond the specified periods they may well find it desirable to retain their record cards for their own use.

2. *Extension of use of the modified Dental Estimate Form*: This amendment adds to the list of items of treatment which may, in an emergency, be carried out under the modified Dental Estimate Form. The addition consists of a single radiological examination involving one intra-oral or extra-oral film in connexion with either an extraction or the dressing of a tooth in emergency.

3. *List of prescribed drugs*: Amendments are made in the Third Schedule of the Regulations which consist of a list of the drugs and preparations which dentists may prescribe for the patients and which will be dispensed to the patient by a chemist on payment of the usual prescription charge. The amendments involve the addition of four preparations—Glycerin of Borax, B.P.C., Penicillin Tablets, B.P., Trisulphonamide Tablets, N.F., Penicillin Injection, B.P.

A few formal amendments have been made to the list to bring it into line with the British Pharmaceutical Codex 1954 and the National Formulary, 1955. The Dental Practitioners' Formulary 1952 has been brought up to date to take account of the amendments. A copy of the revised edition will be sent to you in the course of January.

4. *Revised Record Card*: The Regulations also introduce a revised form of Dental Record which has been agreed with the British Dental Association. The Regulations authorize either the existing Record Card or the new one and the former should, therefore, continue to be used until stocks with Councils and with dentists are exhausted. Similarly, cards already in use for patients should be used for further treatment until the space is filled.

The sections of the new Card headed "Summary of Estimates" and "Patient's Charges" are included for the use of dentists if they so desire: dentists are *not* required by paragraph 5 of the Terms of Service to complete these sections. It is still open to the dentist to keep records on forms provided by himself so long as these are substantially to the effect of the remaining section of Form E.C.25.

To meet the need for keeping records of regular patients and storing radiographs and correspondence, the revised Record is also being provided in the form of an envelope (Form E.C.25A). Because of the width of dentists' filing cabinets it was not possible to make the envelope wider than the existing card but the new card (Form E.C.25(Rev)) has been reduced in width so that it could be inserted in the envelope.

To avoid waste of the envelopes, which are more expensive than the cards, the British Dental Association has agreed that they should not be used unless the patient is expected to return for regular treatment.

In their next applications to the Council for supplies of records practitioners should show separately how many envelopes (Forms E.C. 25A) they require. The total of cards and envelopes for which they apply should not exceed their normal total of cards. In many areas their requirements will still for some time be met from unexhausted stocks of old cards, which, as explained above, will remain valid.

Booklet on Allocation of Pension in the National Health Service Superannuation Scheme

THE booklet on the allocation of pension under the National Health Service Superannuation Scheme has been revised so that it now accords with the National Health Service (Superannuation) Regulations, 1955. It reproduces the provisions of those Regulations governing the allocation of part of a pension to provide an annuity for the spouse or a dependent on an officer's death, and includes an explanatory memorandum, actuarial tables, and examples illustrating the working of the provisions.

The booklet is intended primarily for Health Service employers to hand to their employees who become eligible to make an allocation. It is also being placed on sale by Her Majesty's Stationery Office, price 1s. net.

LETTER TO THE EDITOR

Dec. 5, 1955

Dear Sir,

I am interested to see in Miss Brown's very useful article "Matrices for Deciduous Teeth" she describes the T-band matrix.

This matrix was used by my late partner H. C. Highton in the years before the first world war, and both he, in earlier years, and I since 1925 have written of, and demonstrated, this simple and effective matrix, for it is of the greatest value in practice. It seems rather a shame to ascribe it to a Dr. Levett who gave his name to such a band being commercially produced in the States.

Nowadays I make the bands from very finely rolled steel sheeting, which is better than german silver or copper, and allows for a tighter contact point.

In my opinion all matrices should be wedged, and the cervical margin should not be touched until the amalgam is fully set.

Yours sincerely,

GERALD LEATHERMAN

35 *Devonshire Place*,
*London W.*1

[When stating that the T-band could be obtained in America under the name of Dr. Levett's matrices, the author had no intention of construing this to mean that he was the inventor. The article does not in fact ascribe the T-band to anyone, except, unfortunately, by implication.—*Editor.*]